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Master thesis

Analysis of project methods and their implementation in a project

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DISSERTATION ASSIGNMENT

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Rules for elaboration:

Objective:
These theses are focused on the use of particular methods in projecting in the observed company. The aim of the analyses will be the evaluation of used methods and the discussion of their suitability with the company management of with other authors from the EU or from the overseas.

Methodological approach:
Based on the theoretical part the author will conduct a survey in a particular company on the bases of quantitative and qualitative analytical methods. Case studies, questionnaires, statistical evaluation of the data are highly recommended.

Framework structure:
1. Introduction. Objectives.
2. Review of literature.
3. Methods.
4. Results, potentially discussion.
5. Conclusion.
X. References.
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Fuhrmann, B. (2014). Projekt Voodoo: jak zachránit i beznadějné projekty a dovést je k úspěšnému konci. Brno: BizBooks.

Kerzner, H. (2013). Project management: case studies (4th ed.). Hoboken: Wiley.

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Statement

I hereby declare that, in accordance with Article 47b of Act No. 111/1998 Coll. in the valid wording, I agree with the publication of my master thesis, in full form to be kept in the Faculty of Economics archive, in electronic form in publicly accessible part of the IS STAG database operated by the University of South Bohemia in České Budějovice accessible through its web pages. Further, I agree to the electronic publication of the comments of my supervisor and thesis opponents and the record of the proceedings and results of the thesis defence in accordance with aforementioned Act No. 111/1998 Coll. I also agree to the comparison of the text of my thesis with the Theses.cz thesis database operated by the National Registry of University Theses and a plagerism detection system.

In České Budějovice, 15.8.2019

…….

Karolína Slabá

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Table of contents

1 Introduction

1.1 Introduction to the project management

1.1.1 What is a project

This work is dedicated to the Analysis of project methods showing on the concrete project. To understand this work it is necessary to firstly describe the meaning of the word project itself. The PMI, Project management Institute founded in 1969 for enhancing the profession of project management, describes project in two parts: "A project is **temporary** in that it has a defined beginning and end in time, and therefore defined scope and resources."[1] "And a project is **unique** in that it is not a routine operation, but a specific set of operations designed to accomplish a singular goal. So a project team often includes people who don't usually work together – sometimes from different organizations and across multiple geographies."[2]

In other resources as Czech literature, the project is described by Jan Doležal, the expert on project management and author of many books about project management likewise: "Project is an unique set of steps leading to aim the goal or final result."[3] If we look into other resources about projects and project management, in every case we will discover, that the project is independent on the ordinary work, has defined start and end, concrete budget and a team of workers who are demanded to accomplish certain task or group of tasks with the methods of the project management.

1.1.2 Project management

The Project Management Institute speaks about project management as: "the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. It has always been practiced informally, but began to emerge as a distinct profession in the mid-20th century."[4] Jan Doležal in his book ‚Projektový management v praxi' speaks about Project management as: "a set of rules, methods and tools, which are helping to coordinate to project teams the collective effort, so they can deliver the correct results, in correct time, for the client and all that with the limited

[1] https://www.pmi.org/about/learn-about-pmi/what-is-project-management, 12.3.2019
[2] https://www.pmi.org/about/learn-about-pmi/what-is-project-management, 12.3.2019
[3] DOLEŽAL, Jan; KRÁTKÝ, Jiří. Projektový management v praxi. GRADA Publishing a.s., 2017. ISBN: 978-80-247-5693-6. Pg. 17.
[4] https://www.pmi.org/about/learn-about-pmi/what-is-project-management, 12.3.2019

ressources."[5] He is also clarifying, that project management does not have any theory. The methods and tools, which are recommended by the global associations of project managers, are being created from the second half of the twentieth century by experiences in different companies.

1.1.2.1 Different phases of the project

Project management can be divided in general five phases of the project:

1) Initiating – defining of the project goals

2) Planning – how are we going to achieve the three main criterias – budget, timing and quality of the project

3) Executing – effective management and leadership of human resources we've chosen for the project

4) Monitoring and Controlling – control if we follow the main aim of the project goal

5) Closing – ensuring that we have done everything that was planned in the beginning for a succesful project[6]

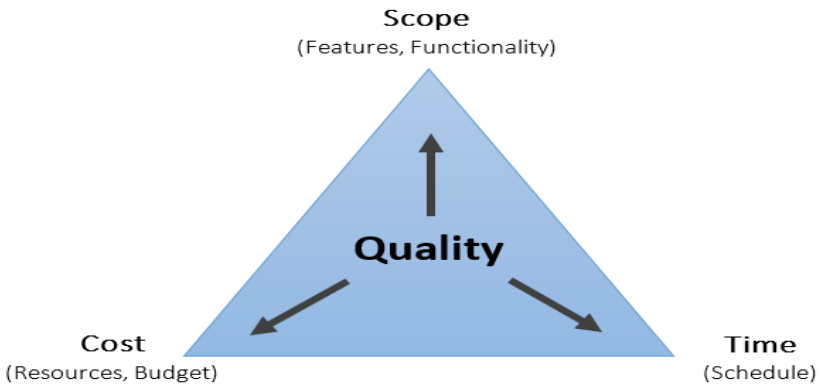
1.1.2.2 Keys to successfull project

In general we are taking into consideration three main principles called the Triple Constraint or also the Iron Triangle. The Triple Constraint defines:

1. **Cost:** The financial constraints of a project, also known as the project budget
2. **Scope:** The tasks required to fulfill the project's goals
3. **Time:** The schedule for the project to reach completion[7]

[5] DOLEŽAL, Jan; KRÁTKÝ, Jiří. Projektový management v praxi. GRADA Publishing a.s., 2017. ISBN: 978-80-247-5693-6. Pg. 17.
[6] ROSENAU, Milton D. Řízení projektů. Computer Press, 2000. ISBN: 80-7226-218-1. Pg. 12, 13.
[7] https://www.projectmanager.com/blog/triple-constraint-project-management-time-scope-cost, 12.4.2019.

Figure 1 Iron Triangle



Source 1Harpreet Dhillon. Triple Constrainst of Project Management. 2018.

These three criterias are for sure the main of many other important criterias of success, as for example the functionality of the project, the satisfaction of the client, if all the expectations of involved people are acomplished or if the impact on the environment is correct. For the successful project we need to include aswell the ‚Soft factors' as resolving the conflicts with commercial partners, the readiness of workers or motivation of project team; which is nowadays very important due to current delicate conversational skills of managers.

Another method of measuring the successfull project is method SMART, which defines the goal of good project:

- Specific – we need to know What?
- Measurable – to define, what we have accomplished
- Agreed – to be sure, that everyone knows and agreed on the given goal
- Realistic – to be sure we can achieve the goal
- Timed – the project needs to have a specific termination[8]

1.1.2.3 Project roles

Each project has to have defined the principle roles of the project team. In the decision process we know four important project roles:

[8] DOLEŽAL, Jan; MÁCHAL, Pavel; LACKO, Branislav a Kolektiv. Projektový management podle IPMA. Grada Publishing a.s., 2010. ISBN: 978-80-247-2848-3. Pg: 63.

Sponsor of the project

Sponsor of the project is normally someone from higher management, who has a right of strategial decision of the company. He represents the connection between the project organisation and the firm environment.

Client

Client, or contract owner is someone, who ordered the realisation of the project. Client defines the outcomes and incomes, specifies the requirements. The role of the client can be merged in with the role of sponsor.

Manager

Manager of the project is responsible of acomplishing the requirements of client and respecting the rules set by higher management. His role is to coordinate his team to successful realisation of the project.

Team member

Team member or also garant of the outcome is responsible of concrete tasks in the project. He respects the budget and deadlines given by higher management. He tracks his work by several reports of progress to the project manager.[9]

1.2 Team creation

1.2.1 Leadership

1.2.1.1 Manager vs. Leader

In a head of every project there must be a leader of the team. Leader is very often mistaken for the manager, but there is a huge difference between a leader and a manager. Business Dictionnary describes manager as follows: „An individual who is in charge of a certain group of tasks, or a certain subset of a company. A manager often has a staff of people who report to him or her. As an example, a restaurant will often have a front-of-house manager who helps the patrons, and supervises the hosts; or a specific office project can have a manager, known simply as the project manager.“[10] Another resource sees manager as „a job title that is used in organizations to denote an employee who has certain

[9] DOLEŽAL, Jan; KRÁTKÝ, Jiří. Projektový management v praxi. GRADA Publishing a.s., 2017. ISBN: 978-80-247-5693-6. Pg. 18,19.
[10] http://www.businessdictionary.com/definition/manager.html, 29.4.2019

duties and responsibilities to lead functions or departments and/or employees. ... The manager who is responsible for a department normally has directly reporting employees for whom he or she has leadership responsibility,“[11] while the responsibilities are:

- Planning and organizing the work
- Following the production efficiency of their team
- Providing support and leadership skills to their team
- Making sure that the task is being accomplished in the right time and with correct budget
- Communication with higher management

As we have noticed, the role of the manager could seem as a leader role, but not every manager is automaticaly a leader. For comparision we can have a look on another definition by Business Dictionnary: „A person or thing that holds a dominant or superior position within its field, and is able to exercise a high degree of control or influence over others.“[12] By Bussiness dictionnary the leadership means:

- establishing a clear vision,
- sharing that vision with others so that they will follow willingly,
- providing the information, knowledge and methods to realize that vision, and
- coordinating and balancing the conflicting interests of all members and stakeholders.
- A leader steps up in times of crisis, and is able to think and act creatively in difficult situations.[13]

In conclusion we can see that leader is higher type of management, someone, who is not only accomplishing the task, but motivating others by his own behaviour and will. Leader is not only managing (giving tasks and controlling them) but stands in the front of the team and their own interests.

There are very important thing that makes leader a leader:

[11] https://www.thebalancecareers.com/what-does-a-manager-do-in-the-workplace-1919121, 29.4.2019
[12] http://www.businessdictionary.com/definition/leader.html, 29.4.2019
[13] http://www.businessdictionary.com/definition/leadership.html, 29.4.2019

- Authority based on personality: In some ressources we can find the authority based on knowledge in the field of work, which can be very usefull, but is not long-lasting. If we imagine the leader of any bigger company, it is not a person who is skilled in every department making part of the concern (marketing, accounting, finance, etc.). Leader is not supposed to know everything, but to know how to motivate and manage people's specific skills to do the best. It is so the strong personality which is important in leadership.
- Being specific/realistic. Leader has to be the most specific but also realistic in the work he is giving to his employees. Some employees aren't that skilled for accomplishing some tasks, and might quickly feel frustrated if they don't understand what they are asked to do. In the same time some workers are better than the others and by giving them all the time tasks under their capabilities they can become rapidly demotivated. The same situation is coming when a manager does not clearly explain or simply gives a task by not thinking any further about all the steps, or he switch from one task to another. This leads to a demotivation of the workers and no accomplished task in the end of the day.
- Empathy – every leader is supposed to communicate with his employees frequently. Employess are not robots, so it is very important to make sure we understand them. By showing up that we want to understand the sometimes difficult situations of the workers, they will very likely understand us.
- Appreciation – a good leader is supposed to recognize his workers for a good work frequently. The simplest is by using words, but also by benefits as vacation, financial benefit etc. (see chapter motivation of the workers.)
- Trust – a trust in workers can be showed by a delegation of tasks. Delegation of tasks is a real art in management and is often mistaken. To delegate means to give a task to a worker with a complete trust and no control. By controlling each step of the worker, he can feel offended and loose the trust towards us. Another mistake in delegating is no delegating at all. Usually the manager says: „I am going to do it quicker than explainig the whole problematics to someone else." This could seem as a short-term gain of time, but in reality spending 20 minutes by explaining to a

colleague now can save us a plenty of time in the future. Some managers are also not delegating the tasks for preserving their „position of indispensability“, which is the worst decision for team health.

1.2.1.2 Eight Habits of leaders by Stephen Covey

We can not skip to another chapter without mentioning Stephen R. Covey's 8 habits of leaders oriented on principles.

- They are always learning – inquiring, self-concious and always searching for knowledge
- They are oriented on service – Ready every morning to „hitch“ themselfs into work. Oriented on service means to be ready to work every day and to take responsibility, make an effort to reach our dreams.
- They always stay positive – a big source of positive energy is able to neutralise the smaller negative energies around.
- They believe in others – they are concious about the weaknesses of others, but they like to understand the humanity of people. A small fault is completely natural. They don't like to classify people, just because for the moment someone is not capable of doing something, it doesn't mean he will not be able to achieve the same thing in the future.
- They are rectified – they are self-concious about their own abilities and weaknesses. They like to be around people with a lot of field of interests (sports, litterature, movies, etc.). They don't need to boast about their work, they are living a simple life. They live for the moment, with no extreme habits (religion, materialism etc.). They can admit that they have made a mistake. They don't need to manipulate and they are happy for someone else's success.
- They enjoy life as an adventure – Their courageousness rises from the iniciation, ingenuity, creativity, a strong will and natural intelligence. It is not based for sure in own security, protection of the plenty or staying in a zone of comfort. They don't judge people by their work position.

- Synergy – synergy is a situation, where a team is more than the simple parts of it. Leaders working with synergy are easily responsible for the impact of the team, it is natural and simple for them, because they believe in capabilities of others.

- They are working on themselfs – they regularly train themselfs in four fields of personality – physic, mental, emotional and spiritual.14

1.2.1.3 Types of leaders

- Autocratic leadership – this style of leadership is all about the boss. The leader takes all the decisions for the workers, without consulting anything with the employees. Autocratic leadership tends to be inflexible.

- Democratic leadership – In democratic leadership the subordinates are involved into making decision. Even when the leader takes the final decision, the workers are making part of the decision process. A democratic leader is known for delegating tasks to others and believing in the abilities of his employees.

- Transformational leadership – Transformational leaders usually motivate others to do more, than they originally intended. Nothing is impossible for them and usually they achieve more than asked.

- Team leadership – Leaders oriented on the team leadership are trying to form „dream teams“ by approaching all the members of team and knowing their forces and weaknesses. This kind of leadership is useful in smaller companies, however in bigger concerns, where stuff needs to be more flexible tends to fail.

- Cross-cultural leadership – nowadays especially demanded by bigger international firms to improve their management on international level.

- Facilitative leadership – facilitative leaders search for efficiency in their teams. They use regularly tracking tools to discover, if their team is working in demanded budget and time horizon. If it’s a case, they do not control the team too much, but if the team is not working effectively, they will be more directive in helping the group with the process.

- Laissez-faire leadership – „Laissez-faire“ from French means a completely independent style of leading. The workers are those, who are responsible for their

[14] COVEY, R. Stephen. Bez zásad nemůžete vést. Pragma, 2003. ISBN 80-7205-904-1. Page 33-39.

own work and they have almost no control. This kind of leading was found by multiple cases and studies as the most unefficient one.

- Transactional leadership – „This is a leadership style that maintains or continues the status quo. It is also the leadership that involves an exchange process, whereby followers get immediate, tangible rewards for carrying out the leader's orders."[15]
- Coaching leadership – the leader in coaching leadership transforms himself more into a coach – he is oriented on improving skills of others, teaching them how to accomplish more tasks in their carrier.
- Charismatic leadership – charismatic leaders are known for their own revolutionary powers. From history we can speak about Oprah Winfrey or Barack Obama.
- Visionary leadership – visionary leaders are implementing vision of the company in the work. They are motivating workers based on the unique vision.[16]

1.2.2 Teamwork

„Teamwork can be defined as the ability of team members to work together, communicate effectively, anticipate and meet each other's demands, and inspire confidence, resulting in a coordinated collective action."[17] In front of every successfull team there is a competent team leader.

1.2.2.1 Team minimums

For tracking the team activity we can use the team minimums.

- ❖ Team – it means in general setting of rules, team values and scheduling the week meetings
- ❖ Plan – each member of the team knows what is his task for following day/week/month
- ❖ JD – every member of the team comprehends the job description, the team leader makes sure everyone knows what he has to do and how is he going to do it
- ❖ Training – everyone is encouraged in his work to learn

[15] https://wisetoast.com/12-different-types-of-leadership-styles/, 30.4.2019
[16] https://wisetoast.com/12-different-types-of-leadership-styles/, 30.4.2019
[17] https://www.sciencedirect.com/topics/medicine-and-dentistry/teamwork, 12.3.2019

- ❖ Tracking and Coaching – teamleader uses the coaching method for encouraging his team members for better results
- ❖ Evaluation and Reflection – the work is being tracked and revised after, rescheduled or not. Important part of the evaluation is feedback.

1.2.2.2 Motivating workers

To provide the best results it is really important to know how to motivate the workers. As we look deeper in the study of motivation, we can describe the theory X and the theory Y. These two theories were described by Douglas McGregor and suggest „two aspects of human behaviour at work, or in other words, two different views of individuals (employees): one of which is negative, called as Theory X and the other is positive, so called as Theory Y.“[18]

Theory X ('authoritarian management' style)[19]

- The average person dislikes work and will avoid it if he/she can.
- Therefore most people must be forced with the threat of punishment to work towards organisational objectives.
- The average person prefers to be directed; to avoid responsibility; is relatively unambitious, and wants security above all else.

Theory Y ('participative management' style)[20]

- Effort in work is as natural as work and play.
- People will apply self-control and self-direction in the pursuit of organisational objectives, without external control or the threat of punishment.
- Commitment to objectives is a function of rewards associated with their achievement.
- People usually accept and often seek responsibility.
- The capacity to use a high degree of imagination, ingenuity and creativity in solving organisational problems is widely, not narrowly, distributed in the population.

[18] https://www.managementstudyguide.com/theory-x-y-motivation.htm, 13.3.2019
[19] https://www.businessballs.com/improving-workplace-performance/mcgregors-xy-theory-of-management/, 13.3.2019
[20] https://www.businessballs.com/improving-workplace-performance/mcgregors-xy-theory-of-management/, 13.3.2019

- In industry, the intellectual potential of the average person is only partly utilised.

These two theories are for sure the extreme stands of the employee behaviour, however they are both true. There are for sure some jobs which are not so interesting and they might be boring, and the motivation of the workers would be much more difficult than motivating someone with entretaining job. For the final result but also the athmosphere in the work it is highly important to know how to transfer someone's temper and style of thinking from theory X to theory Y.

1.2.2.2.1 Maslow pyramid of needs

The human needs are making part of another theory, the Maslow's hierarchy or pyramid of needs. This theory of Abraham Maslow was nowadays disproved by certain economists and experts on human behaviour, but still takes place in the economical theories of needs. It is working with the idea of hierarchy of particular needs, starting with the basic ones and following by the more complex ones:

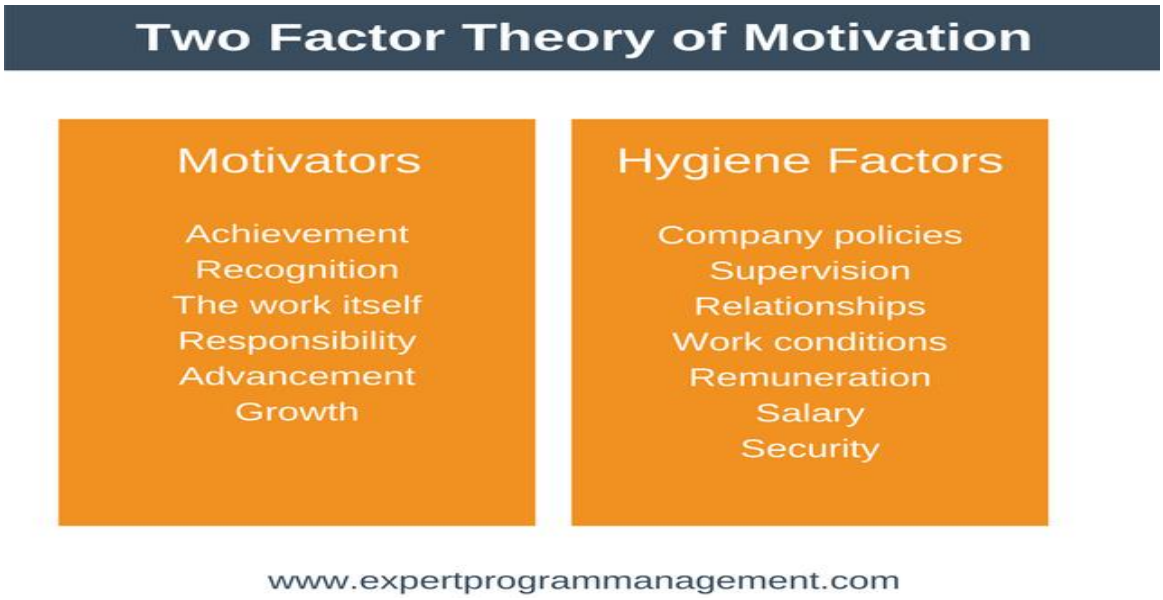
- Physiological needs– includes air, food, water, sex, sleep etc.
- Safety – includes security of environment, employment, resources, health, property etc.
- Belongingness – includes love, friendship, intimacy, family etc.
- Esteem – includes confidence, self-esteem, achievement, respect etc.
- Self-actualization – includes morality, creativity, problem solving etc.[21]

1.2.2.2.2 Hertzberg theory

Hertzberg's two factor theory or also Motivation-Hygiene theory is describing two categories of factors. The first one, hygiene factors are those, which are leading people to negative emotions. The second group, the motivational factors, are arising nice emotions in people.[22]

[21] https://www.learning-theories.com/maslows-hierarchy-of-needs.html, 13.3.2019
[22] FORSYTH, Patrick. Jak motivovat svůj tým. Grada publishing, a.s., 2009. ISBN: 978-80-247-2128-6. Page 18.

Figure 1 Two factor theory of motivation



Source 1 expertprogrammanagement.com

Hygiene factors[23]

Company policies

In company policies we are including all the paper work which needs to be necessarily done - formulars, documents, invoices etc. It is important to make this routine very simple and easy to do, because with the time, the increasing bureaucracy can become too obstructive. The manager needs to control the company policies and their systematic resolutions to avoid employee's demotivation.

Supervision

The manager is the first person responsible for the work environment's mood. The manager needs to be responsible for his communication skills, which are representing his managerial abilities, but also he needs to know, that every step in resolving tasks is influencing the thinking of his employees. Negligence of good supervision leads to demotivation of workers and betray of trust, which is very difficult to gain back.[24]

Relationships

In every society we have people working in teams, who need to cooperate on different projects and tasks. The team work is more and more important, as well as communication between the members. The manager needs to create a team of people,

[23] https://expertprogrammanagement.com/2018/04/herzbergs-two-factor-theory/, 13.3.2019
[24] https://www.mindtools.com/pages/article/herzberg-motivators-hygiene-factors.htm, 14.3.2019

which will be capable to work together without any bigger difficulties, and if so, he needs to know how to resolve the problems. Employees should have some possibilities to strenghten the relationships between them, as teambuildings, company events or relax areas in the company.

Work conditions

Efficiency and performance are also influenced by the work conditions. Working space, equipment, and everything from air-conditionning to comfortable chairs is influencing the worker's thinking. Noone is expecting a luxury car and the newest telephone, but without tools necessary for work, the employess's demotivation can rise.

Remuneration, status

People are seaking naturally for respect in the society and higher status. The manager should be able to consider the employee's age, experience, success etc. Management has to have respect to their own subordinates, and needs to communicate well. Employee, who has to respond often „I have to ask my manager", is probably feeling inferior in his role, than in reality.

Salary

For sure the salary is one of the biggest parts of motivation. It is very important to be capable to explain to employees why he is in this salary category. In majority of companies is prohibited to talk about salary just for this reason, because the company is in making salary of concrete employee more spontaneous and does not have any salary structure. This opens a lot of questions in the working environment and people who do not have as high remuneration as others are feeling discouraged and demotivated.

Security

With security in the society we understand:

- Organisation, which has clear mission and good communication policy
- Clear job description and competences required for the job
- Familiarity with expected work and how it is going to be measured
- Work in effective team

- Working for a competent manager
- Management, which is doint correct decisions
- Omission of pointless secrets [25]

Motivators

Achievement

In achievement in working area it is necessary to provide to people the appropriate measure scale. The goals, formal or informal, are very important. Formal goals are for example:

- Quantity sold by a sales manager
- Quality of work and time spent for the work
- How skilled are the workers
- Knowledge how to make savings
- Speed and efficiency
- Measure of productivity
- Satisfaction of clients[26]

John Adair, british leadership theorist, in his book Effective Leadership, talks about achievement as a motivational factor as a feeling, that we have accomplished some task, resolved some problem, or realized some succesful sale.[27]

Recognition

After achievement of the goal, the managers tend to appropriate the recognition for themselfs. However the employee needs to be recognized after accomplishing the

[25] FORSYTH, Patrick. Jak motivovat svůj tým. Grada publishing, a.s., 2009. ISBN: 978-80-247-2128-6. Page 28,29.
[26] FORSYTH, Patrick. Jak motivovat svůj tým. Grada publishing, a.s., 2009. ISBN: 978-80-247-2128-6. Page 31.
[27] ADAIR, John. Jak efektivně vést druhé. Management presse, Praha 1993. ISBN: 80-85603-40-3. Page 146.

goal. If the job desription isn't clear and the employees are confused about what they are supposed to do, the recognition for the task can be very difficult.

Recognition of the team can be made by financial evaluation, promotion, or some bonuses, but also in very simple way, by a written or oral acclaim. It is very important to repeat to workers simple phrases as: „Good job!" or „You have already finished?" It is felicitous aswell to acclaim in public, than in privacy, and by someone from higher management. Another tools how to recognize employees is by proclamation of the „employee of the month" or giving some awards.

The work itself

We live in the world where people are spending most of their time in the work. It is therefore necessary to like the job, or find it at least a little bit interesting. Managers seak to reduce the unattractivity of the position by:

a) Job enrichment – extension of the job tasks, thus from decision making, controlling and management. The workers are having more responsibilities and competences. The emphasis on responsibility but also importance of every worker is increasing the interest in the task.

b) Job enlargement – This form is fighting with big specialisation. The team responsible for the task has wider scope of responsibilities, and therefore sees the final result with its continuity.

c) Job rotation – managers are using this form mainly for the interns and absolvents, to show all the departments of the company. The worker is motivated by prevention of the routine and stereotype and also gets to know the work of others well, so he can cooperate more easily with others. [28]

Other factors of interestingness of the work can be improved by:

a) Equipment – PC, mobile phone etc.

b) Functionality – functional system, software, work tools

[28] KHELEROVÁ, Vladimíra. Komunikační dovednosti manažera. Grada Publishing s.r.o., 1995. ISBN: 80-7169-223-9. Page 112,113.

c) Comfort – for example parking spot next to work, provision of childcare etc.

d) Saving of time – lunch cantine in the company etc.

e) Environment – nice calm environment[29]

Responsibility

Responsibility in the work isn't that apparent but is very important. By the study in one accounting company, the employees started to sign themselfs on the letters to customers instead of waiting on signing them by the employer. The efficiency and accuracy of the workers increased greatly. Giving a responsibility to workers is making them feel more important in the company, so they are motivated to do a better work. (!Too much of a responsibility is a demotivator!)

Advancement

For sure the advancement is a huge motivator for the employees. Almost nobody wants to stay at one place for the rest of his life. The advancement does not mean only a higher salary, but also a higher respect, which is leading to higher motivation. It is recommended to apply a hierarchy of multiple different position in the company to motivate the employees. Each step of advancement means a higher recognition for the employee but also a higher motivation to do a greater job. An employee without a vision of advancement can be soon demotivated and unwilling to do his daily work.

Growth

We have already spoke about the advancement in one company. When we are talking about growth, we speak about advancement or moving to another branch of the whole concern. It means that an employee from London can be sent to manage a new factory in India, for example.

[29] FORSYTH, Patrick. Jak motivovat svůj tým. Grada publishing, a.s., 2009. ISBN: 978-80-247-2128-6. Page 36,37.

1.3 Introduction to the project SUEZ

The analysed project is from specific area of industry, concretely the extension and rehabilitation of the factory of the company SUEZ in Schweighouse-sur-Moder in Alsace, France. The client ordered new building dedicated for the new airfilter for lowering the emissions produced by the factory. In the project are added also complementary works as refurbishment of the silos or piping works.

The author of this thesis analyses the project work of one of the supplier of SUEZ, the company EFM Steel. The ‚mother' company EFM Steel was approached by society CNIM, in this case the Head manager of the project, to realize the assembling works.

Brief introduction of the analysed company

Company EFM Steel resides in Luxembourg, where is located the main office of the CEOs and higher management but also a steel factory with more than 50 workers. The company is specialised in fabrication and assembling of steel constructions, piping, mounting of silos and wells. They are focused on lime factories, cement works and waste cleaner factories. EFM Steel Luxembourg owns also two subsidiaries in Belgium, INR Bodson and Louise, where is high potential of industrial commerce, with a focus on craning. In 2017 the EFM Steel France, the French subsidiary of EFM Steel Luxembourg was created, and briefly increased the sales of the whole company. Shortly after creation of EFM Steel France, EFM Design was created in Chennai, India. EFM Design is focused on designing the engineering projects in the field of industry described higher.

The project which is analysed in this thesis was gained by the bureau EFM Steel France. This office represents a big part of incomes for the whole company, almost 60%, even though it has only 4 permanent employees. EFM Steel France resides in Valenciennes, in the north of France, which is very industrial area.

1.3.1 Suppliers

Assembling works

For the mounting of the steel construction was hired our analysed company EFM Steel France. To understand more the problematics of the project, we need to explain the politics of own suppliers of EFM Steel France.

The policy of suppliers of EFM Steel France is international. The French team itself is made by director, who comes from India, a project manager from Portugal, another project manager from Morocco, French accountant and Indian interns. This company is supported by the production from the head office in Luxembourg, but supplies the assembling works to the multiple companies in Czech republic and Slovakia. The whole ensemble is composing a true international area.

Material

Material for this project of extension and rehabilitation was ordered by the client SUEZ and provided by another supplier than our analysed company, concretely Polish company Mostostal Siedlce.

Architect

The architect of the project is a Studio Wolfhugel, which was also ordered by client. This supplier was responsible for the architecture of the building.

Design department

The design departement is an office CNIM from South France.

Civil works

For the works of civil engeneering the client chose society Urban Dumez.

Technical control and Health and Safety controlor

For this task the client hired society well know in France, the firm Apave. Because it is a big project, the client requested a specialized company on health and safety control, which is very strict nowadays in French construction environment and an inseparable part of the construction works.

In this work I am going to focus on the company EFM Steel France, but also the cooperation with other companies, and the project analysis as the whole unit.

1.4 Objectives

The aim of this thesis is to:

- Analyse the project SUEZ with use of project management methods
- Improve the project management strategy in chosen company
- Learn from faults to improve the work in the future

This work is created with purpose to improve the project management strategy of chosen company using the project of extension and rehabilitation of the company SUEZ as an example. This project was chosen because of its large and difficult scope but also because of the implementation of the new strategy of company EFM Steel France.

The work is divided in parts of project management phases – initiating, planning, executing, controlling and measuring and closing. Each chapter includes a theory based on literary and web sources but also methods of project management, with examples applied on the project in Schweighouse-sur-Moder.

2 Literature review

Thesis „Analysis of the project management methods and their implementation in the project“ discuss the problematics of multiple fields of study. The main subjects are for sure the project management and the methods of project management. Main information for this work structure was looked up in various sources – Czech and English literature, web sources and scientific articles.

The literature research was based on the centre of project management knowledge – the Project Management Institute. The author cooperated with the book *Projektové řízení podle PMI* by Petr Řeháček as a czech source and compaired the information with other project management literature – mainly the guide to the *Project Management Body of Knowledge* written by the Project Management Institute itself.

This literary sources gave the general structure to this thesis, in following the division into the project management phases. Other source of interest were the books of Jan Doležal, expert on project management, who has written already multiple books with the theme of project management. The author of this thesis compared to aforesaid books also the book *Projektový Management v Praxi*, a book written by Jan Doležal, which uses the methods of project management and show them in practice. Another book (partly) written by Jan Doležal, which author of this work used for the study, is the book *Projektový Management podle IPMA* (International Project Management Association). The structure vary from the structure of PMI, but complete the information by different point of view. From the international sources the research was oriented on famous names as Stephen Covey, the international expert on management or Paddy O'Brien (*Positive Management*).

From the web sources the author concentrated her research on the approved management sites as ManagementMania, Management.cz, the websites of the Project Management Institute or PM Consulting.

As the scientific articles platform the EBSCO of the Jihočeská University was used and the international platform O'Reilly.

In this work the author collects the most important methods already proven by the Project Management Institute and show them in practice with the aim of analyse of the project Schweighouse. The literal research serve not only for making the structure to the

project of Schweighouse and its later use in company, but also as the guide to the project management methods.

3 Methodology

In the project management, the process methodology is not strictly demarcated as each project varies from another. For example, the process of the construction project from private sector will be different from the project of public sector made from European funds. Even though the process can not be strictly determined, some institutions propose a frame to projects.

As already mentionned in the previous chapter, the structure of the Project Management Institute was respected in this work. The Project Management Institute is the largest non-profit world organisation, which was founded in 1969 by project managers. Nowadays, the PMI has around 500 000 workers all around the world.

The author of this work used also as the source of information the International Project Management Association, which is an organisation unifying the project managers all around the world. These two organisations proposed different views on project management structure, but in the same time stay as the trends in project management.

3.1 PMI structure

The Project Management Institute structure is divided into project management phases. The phases are following:

1. Initiating
2. Planning
3. Execution
4. Monitoring and controlling or operations management processes
5. Closing

All the phases infiltrate into each other, depending on the project character. In each phase three steps are determined:

- Inputs – documents or other entries of documentation which are necessary for the project processes
- Tools and methods – all the techniques which we can apply on the inputs with the goal of developping the outputs

- Outputs – documents or other entries of documentation which make the outputs of the project

3.1.1 Main spheres of the project management and their processes

The book made by Project Management Institute – Project Management Body of Knowledge is dividing the project management processes by nine main spheres:

- Management of integration – processes needed for the smooth cooperation of the project. Includes the plan development, realization of the plan.
- Procurement – describe the processes necessary for correct procurement of material delivery. Includes the ordering and chosing of correct material, management of contractual relations, closing of contractual relations.
- Time scope – describes all the processes necessary for the right planning of time. Includes the time estimating, development of time schedule.
- Costs – describes the necessary costs for the project with the respect of the budget. Includes the estimating of costs, planning of costs, and operations management of costs.
- Works scope – describes all the processes necessary for the smooth development of the project – all the works which have to be done. Includes the initianing of the project, planning, control and operations management.
- Quality – describes all the requirements of quality for meeting the demands of client, norms or other involved parties of the project.
- Human ressources – describes the processes of the efficient use of human ressources in the project. Includes the organisational arrangement of the project, recruitment of the workers and developping of the team.
- Communication – describes all the processes required for collecting, difusing, stocking and transfering the right information to the right persons.
- Risks – describes the risk management processes – risk analysis, reactive behaviour, emergency arrangements etc.[30]

[30] Řeháček, Petr. *Projektové řízení podle PMI.* Ekopress. Praha 4, 2013. ISBN 978-80-86929-90-3. Page 24.

3.2 IPMA structure

The International Project Management Association works with same data but from different point of view. The IPMA is dividing the project management frame into three competences, which make all together the IPMA competence baseline:

1. Technical competences
    * 1.2 Stakeholders
    * 1.3 Project requirements and objectives
    * 1.4 Risks and opportunities
    * 1.5 Quality
    * 1.6 Project organization
    * 1.7 Teamwork
    * 1.8 Troubleshooting
    * 1.9 Structures in the project
    * 1.10 Scope and delivered project outputs
    * 1.11 Project time and phase
    * 1.12 Resources
    * 1.13 Costs and financing
    * 1.14 Procurement and contractual relations
    * 1.15 Changes
    * 1.16 Control, management and reporting
    * 1.17 Information and documentation
    * 1.18 Communication
    * 1.19 Start
    * 1.20 Termination
2. Behavioral competences
    * 2.1 Leadership
    * 2.2 Engagement and motivation
    * 2.3 Self-control
    * 2.4 Assertiveness
    * 2.5 Release
    * 2.6 Openness
    * 2.7 Creativity
    * 2.8 Results Orientation

* 2.9 Performance
* 2.1 Discussion
* 2.11 Negotiation
* 2.12 Conflicts and crises
* 2.13 Reliability
* 2.14 Understanding values
* 2.15 Ethics

3. Contextual competences
    * 3.1 Project Orientation
    * 3.2 Program Orientation
    * 3.3 Portfolio Orientation
    * 3.4 Implementation of the project, program and portfolio
    * 3.5 Permanent organization
    * 3.6 Business
    * 3.7 Systems, products, technology
    * 3.8 Personnel Management
    * 3.9 Health, safety, life and environment protection
    * 3.10 Finance
    * 3.11 Law

This work compares the PMI with the IPMA structures, but follows the frame of the Project Management Institute.

3.3 Analysis

Analysis is described by the Merriem-Webster dictionnary as: „a detailed examination of anything complex in order to understand its nature or to determine its essential features**:** a thorough study“[31]. The author of this thesis has chosen the analysis as the method of qualitative study and therefore the best tool how to have different views on a complex structure as a project in construction area.

For the analysis the approved methods of project management were used. Each method is described in parts Initiating, Planning, Execution and Monitoring and Controlling and shown on example. The chosen methods are standardly used by project

[31] https://www.merriam-webster.com/dictionary/analysis, 31.7.2019

managers all around the world. For each phase the author has chosen these methods for analysis:

1 Initiating

   a. Feasibility study
   b. SWOT analysis
   c. SMART method
   d. PESTLE

2 Planning

   a. Requirement Traceability Matrix
   b. Work Breakdown Structure
   c. Critical Path Method
   d. Graphical Evaluation and Review Technique
   e. Program Evaluation and Review Technique
   f. Gantt chart
   g. RASCI method
   h. Resource histogram
   i. Top-down estimating method
   j. Bottom-up estimating method

3 Executing

   a. Ishikawa diagram
   b. Causal chain diagram
   c. Causal tree analysis
   d. Case studies

4 Monitoring and controlling

   a. Milestones
   b. Pareto's chart
   c. Issue log
   d. Schedule
   e. Reports
   f. Earned Value Management

5 Closing

All the methods are described in each chapter with corresponding example.

4 Initiating of the project

Initiating of the project is the act of getting to know that a new project is being created. In some companies there are no new projects before the company knows, that a feasibility study, business case or another analyses approves a clear process of the project. Some types of projects are treated informally, and they are based only by:

- Demand of the market
- Business needs
- Demand of the client
- Technological advance
- Legal requirement

These impulses can be seen as problems, opportunities but also needs of the business. It depends how we react to solve them. In the project of extension and rehabilitation of the factory SUEZ, for the company EFM Steel we speak about the business opportunity. For company SUEZ we can speak about the legal requirement, since the European Union with its strategy EU 2020: „By 2020, the EU aims to reduce its greenhouse gas emissions by at least 20%, increase the share of renewable energy to at least 20% of consumption, and achieve energy savings of 20% or more. All EU countries must also achieve a 10% share of renewable energy in their transport sector.“[32]; but also as a technological advance, as it is described on the site of SUEZ.com: „Natural resources are becoming scarcer and are deteriorating while demand rises. We are designing and implementing innovative solutions to take on the four major challenges of the resource revolution: developing access to the resources, protecting these resources, optimizing their use and producing new ones. This is how we're helping to secure the resources essential to our future.“[33]

Feasibility study

For better understanding of the initiating process of the project, it is important to make a feasibility study. A feasibility study is „An analysis and evaluation of a proposed project to determine if it (1) is technically feasible, (2) is feasible within the estimated

[32] https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/2020-energy-strategy, 5.5.2019
[33] https://www.suez.com/en/what-we-do/our-mission, 5.5.2019

cost, and (3) will be profitable. Feasibility studies are almost always conducted where large sums are at stake. Also called feasibility analysis.“[34]

4.1 Inputs

4.1.1 Description of the product

The product of following project was described by the officers in the act of basic demarcation as:

Mounting of the construction unit and boiler making on the site of waste treatment Schweighouse-sur-Moder.

The outputs of the projects are:

- Mounting of the steel structure and boiler making works
- Supervision of the works with coordination meetings

4.1.2 Strategic plan

Each product of the society needs to support the strategic goals of the organisation. For a better understanding of the strategy of the company EFM Steel, we had used the vision, mission and SWOT analysis.

4.1.2.1 Vision

Benny Changivy, the director of EFM Steel France describes the vision of the company as: developping a stable position of the EFM Steel group on the French market.

Through the years the company was really enforcing its position on the French market:

2016 – turnover of the company was 1 000 000 euros

2017 – turnover: 2 000 000 euros

2018 – turnover: 4 000 000 euros

2019 – turnover by 1.6. 2019 3 000 000 euros

4.1.2.2 Mission

We have already described the vision of the company, but what is the mission? By website Diffen, the difference is such: „While a mission statement describes what a company wants to do *now*, a vision statement outlines what a company wants to be in the *future*.“[35]

[34] http://www.businessdictionary.com/definition/feasibility-study.html, 8.5.2019
[35]https://www.diffen.com/difference/Mission_Statement_vs_Vision_Statement, 8.5.2019

The mission of the company EFM Steel can be described as:

- Contacting and making strong partnerships with companies in lime and waste treatment industries mainly in north-west regions in France
- Strenghten partnerships with companies with which EFM Steel already worked
- Developping a self-contained structure of succesful teams

4.1.2.3 SWOT analysis

SWOT analysis is a tool for showing the competitiveness of the company, by analysing the strenghts, weaknesses as internal factors and opportunities and threaths as external factors.

Table 1 SWOT Analysis

Internal factors	
Strengths	**Weaknesses**
delivery of the product adapted on the demands of the client, flexibility, high motivated workers, price competitor for other firms	to be reactif, organisation of sources and employees, small company-ca-shflow problems
cooperation with eastern countries-higher competition of price, part-nership with bigger client, speciali-zation in lime industry and waste tre-atment	high competition in some regions, big technological progress
Opportunities	**Threaths**
External factors	

Source 2 Karolína Slabá

4.1.3 Selection criterias for the project

For this project there were following criterias of selection:

- Knowledge of the industry – company EFM Steel is specialized on mounting filtres and chimneys in the lime and waste treatment industries.
- Client CNIM – society CNIM is a strong company with a huge tradition in industry in France, but also in many countries all over the world.

„Founded in 1856, CNIM is a French equipment manufacturer and industrial contractor operating on a worldwide basis. The Group supplies products and services to major public and private sector organizations, local authorities and national governments in the Environment, Energy, Defense, and high technology markets.“[36] From the website of the company CNIM we can find out aswell that they made 689.8 millions euros turnover in year 2018. Having a such a strong client can signify a steady income all over the year.

- Environmental question – „CNIM provides a response to the twin challenges of driving energy efficiencies for its clients and reducing the environmental impact of its activities – at the Group's own sites, as well as those of its customers.
  CNIM has established a proactive CSR approach and is committed to building balanced, long-lasting relationships with all of its partners as it develops the Group's business activities.“[37] EFM Steel company would like to follow this vision of environmental impact in industry and implementation of the new technological solutions for saving our planet.

4.1.4 Historic context

In historic context of the company EFM Steel, the firm in its almost 4 years of existence oriented its business mainly on projects from lime industry and waste treatment industries.

Table 2 Historic context

Year	Company	type of industry	problems	overall note by director
2016	Veralia	glass	delay	7
2017,2018	Sibelco	waste treatment	delay	7
2017	Hoganas	metalic powder	no problems	9
2018	Carmeuse	lime	plans of design design office not corresponding to the plans of fabrication	5

[36] https://cnim.com/en/group/about-us, 6.5.2019
[37] https://cnim.com/en/group, 1.4.2019

2018	Eqiom	lime	organisation of the works, coope-ration with other companies	8
2018	Vidrala	cement	organisation of the works	8
2019	CNIM	waste treatment	organisation	7

Source 3 Karolína Slabá

The overall note by director of EFM Steel is ranked from 1 – the worst to 10 – the best. From the Excell chart above we can see, that the lime industries are not easy to work in, the furnaces in lime industries are extremely expensive and usually owners don't have the sources to refurbish the whole factory. For mounting companies the work is neither an easy job, because usually everything is covered in lime, which can be very harmful in contact with water (may cause serious burns). Mounting on old structure has to be taken into account aswell, because time and the weather conditions are making with the structure some little changes, which can be very relevant if everything is projected in milimetres.

In contrast to lime industries the waste treatment industries are cleaner to work in. Usually it concerns new structures with installation of new machines, which is easier to do.

4.2 Tools and techniques for initiating

4.2.1 Selection methods of project

None of the selections methods were used for this concrete project. The author of this work decided to show the decision process on two managerial methods, SMART method and PESTLE method.

4.2.1.1 Method SMART

- Specific – What we need to know?
    - A project was described by its different parts by the quotation in the budget offer (see chapter 5.)
- Measurable – to define, what we have accomplished
    - Measurement of the project is more described in chapter 7.
- Agreed – to be sure, that everyone knows and agreed on the given goal

- The agreement of company CNIM and company EFM Steel was approved in the demarcation act, in this case the contract

- Realistic – to be sure we can achieve the goal
  - The project was considered as realistic due to the calculations by sales director in time scope and budget scope. The costs were minimal due to mounting works (no fabrication, all the consumables were on the charge of the client)

- Timed – the project needs to have a specific termination
  - Time delays in construction are very important due to the need of fabrication of the factory. In this project no specific delay penalties were specified between company EFM Steel and CNIM. Between CNIM and the client the penalties were agreed on 125 000 euros a week.

4.2.1.2 PESTLE

PESTLE analysis is a strategic technique serving to analyse the surroundings of the company. In this work we are going to implement the PESTLE analysis on our project. PESTLE are followings factors, which can have great impact on the society:

POLITICAL – as political factors which can have an impact on the company and the project we can for sure name a current situation in France, with its leader Emmanuel Macron.

„The French employers' federation Medef has condemned as "totally unacceptable" President Emmanuel Macron's plan to increase corporate tax bills to help pay for cuts in personal income tax for the low-paid,"[38] stated an article in Financial Times in April 2019. With a social crises with massive protests againts president Macron with head protesters in form of „Gilets jaunes", noone really knows how the situation will be solved in the future.

ECONOMICAL – in year 2019 no economical crisis, neither the threats on international or national level were recorded.

[38] https://www.ft.com/content/d9957d20-681d-11e9-9adc-98bf1d35a056, 6.5.2019

SOCIAL - The company SUEZ is located in the industrial area in Schweighouse-sur-Moder. The construction site does not influence any inhabitants of Schweighouse, does not disturb the traffic or the ordinary lifes of the inhabitants.

TECHNOLOGICAL – the technology used for the project is considered as common and stable on the market. Company EFM Steel profits from new technological possibilities, so it is not endangered by technological progress.

LEGAL – Project of extension and rehabilitation of the factory SUEZ was spurred by the change in the EU legacy about the industrial emmissions: „Industrial production processes account for a considerable share of the overall pollution in Europe due to their emissions of air pollutants, discharges of waste water and the generation of waste. Directive 2010/75/EU of the European Parliament and the Council on industrial emissions (the Industrial Emissions Directive or IED) is the main EU instrument regulating pollutant emissions from industrial installations. The IED was adopted on 24 November 2010.“[39]

ECOLOGICAL – The European Union's Commission also states that: „The IED contains mandatory requirements on **environmental inspections**. Member States shall set up a system of environmental inspections and draw up inspection plans accordingly. The IED requires a site visit to take place at least every 1 to 3 years, using risk-based criteria.“[40] Company SUEZ was so obligated to implement a strategy of European Union to lower the environmental risk and built a filtre of air.

4.2.2 Professional judgement

For coherent consideration of the inputs of the process a professional judgement is required. Usually it is made by a group or single person with technical knowledge and experience. It can concern other sources as well, as:

- Other organisational units in the frame of the company
- Extern consultant
- Professional and technical associations

[39] http://ec.europa.eu/environment/industry/stationary/ied/legislation.htm, 6.5.2019
[40] http://ec.europa.eu/environment/industry/stationary/ied/legislation.htm, 7.5.2019

In our case the professional judgement about the project was made by Mr. Benny Changivy, the technical sales director, who has 15 years experience in the field of industry and a technical diploma from University Valenciennes et du Hainaut Cambrésis.

4.3 Outputs of initiating

4.3.1 Demarcation act

The demarcation act of the project is a document, which officialy approves the existence of the project. It concludes the

- Needs of business
- Description of the product

The act of basic demarcation is released by the operative, who can see all the aspects of the project. This act gives to the manager of the project all the responsibility to use all the sources of the organisation for this project.

In some cases the contract can be used as an act of basic demarcation, which is the case for EFM Steel company. The contract is based on the offer made by the technical sales director, engineer Benny Changivy, the head manager of EFM Steel France.

This contract was signed 15th of December by the office EFM Steel France and CNIM company, which has the role of the contracting authority. The document specifies:

A. Technical specifications

a. Mounting

We have planned the assembly of all the supplies described below:

 A structure of metal frame, A set of smoke ducts

 One line saver

 A bag filter with three cells per line

 A set of REFIOM conveyors

 One condensate heater per line One silencer per line

 One line fan

 One set of dosing and bicarbonate transport per line

For common parts of 2 lines:

 Handling, Lifting (the crane is the responsibility of the customer) and mounting of the silo REFIOM

 The common mechanical conveyor system of the REFIOMs

 The common pneumatic conveying system of the REFIOMs

 An installation of a complete compressed air production station, piping at the expense of the customer

i. Deconstruction

Studies, supplies and deconstruction works:

 the storage silo REFIOM. (scaffolding, cranes and all the logistics are the responsibility of the customer)

ii. Modifications

Current transportation and extraction system of the activated carbon silo.

 The current transport and extraction system of the two lime silos for switch to sodium bicarbonate.

 Implementation of a system of weight measuring scales for each of the 2 silos of bicar

iii. Waste treatment

Handling and loading to the waste containers are our charge however the appropriate waste treatment is the responsibility of the client.

b. <u>Supervision – tests – commissioning</u>

The supervision is assured by the company EFM Steel by making coordination meetings and work advancement.

B. Offer content

- Delivery plans

C. Exclusions

- Equipment and atmosphere statements (for exemple zone ATEX – from french „**AT**mosphères **EX**plosibles“)
- Civil engineering
- Rent of the crane necessary for mounting
- Scaffolding for safe mounting
- All the vehicles needed for mounting (cranes, manitous, work platforms)
- Grounding
- Reception costs by an approved organisation
- The authorization on the work site

- Installation of the waste container
- Realization of civil works
- Instrumentation supply and assembly

D. Client's charge

The client's charge comprised:

- Portakabins for: Lavatories, canteens, bathrooms, offices and changing rooms.
- Work vehicles: Cranes, manitous and aerial work platforms
- Scaffolding
- Other non specified equipments required for the realisation of the works
- Participation at test making and commissioning

E. Price

The initial budget will be more specified in the chapter II. Planning-budget, timing and quality of the project.

F. Delay

The start of the construction works was settled on 7th of January 2019. The sales manager clarifies:

„*The above deadlines may be respected in the condition that the information necessary for the good progress of the studies (interface frame, piping, electrical etc ...) and the site plans (planning of assembly of the structure etc ...) are transmitted within a coherent period. The customer can only operate our equipment after the delivery and the on-site reception. If he exploits before, the warranty period begins on the date of connection of the equipment on site.*"

G. Conditions of payment – set up by the sales manager as follows:
   - 20% to order
   - 70% by the progress of construction
   - 10% at the reception

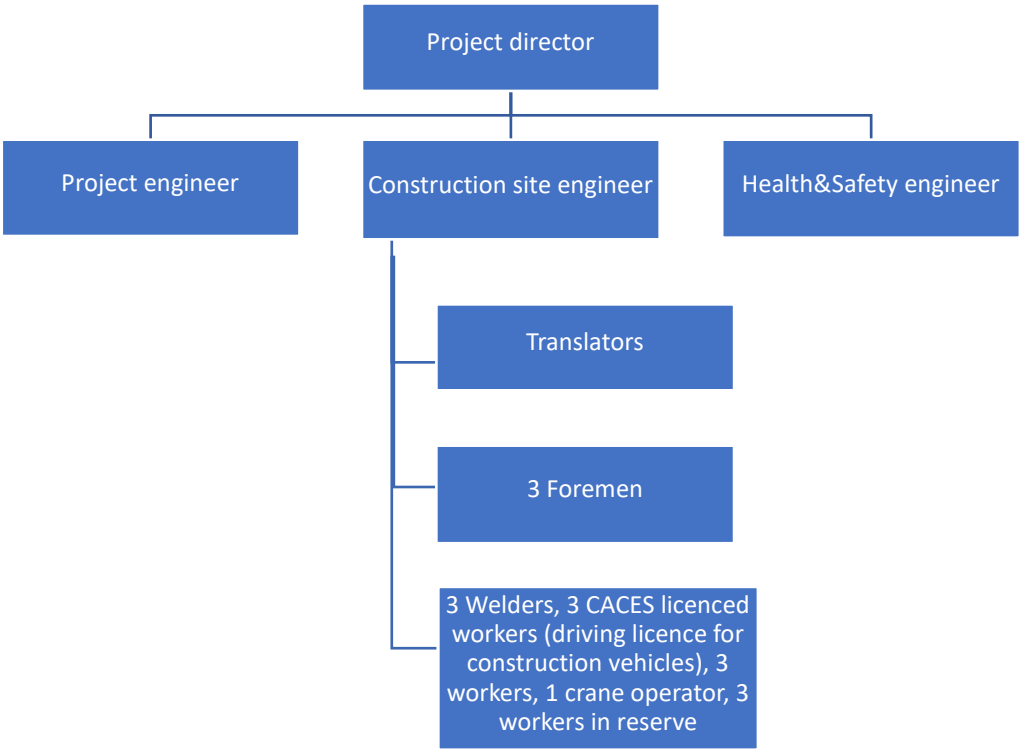
The original basic act of demarcation can be found in annexes (see annex n˚1.)

4.3.2 Project team

4.3.2.1 Team hierarchy

In this table we can see the hierarchy of the project team for the project of extesion and rehabilitation of SUEZ factory.

Figure 2 Team hierarchy in analysed project



Source 4 Karolína Slabá

4.3.2.2 Head manager

The head manager of the project became Mr. J. Benbouhout, one of the four employees of EFM Steel France. Mr. Benbouhout has 15 years experience in the field of industry and 1 year experience in the company EFM Steel France. In the office he represents the role of technical engineer.

4.3.2.3 Team

Team of the project was made by a mix of EFM Steel France workers with EFM Steel Luxembourg workers in management, and contracted eastern companies for execution of the works. As we already mentioned, the head manager was a representant from the office EFM Steel France. In the beginning, only 5 workers were planned until the 21st of January, with the chief manager. From 21st January the team should have been reinforced by another 7 workers, plus 3 foremen, construction site engineer, health and safety engineer and project engineer (more in chapter II. Planning), mainly from EFM Steel Luxembourg.

The team of construction workers was made by a Slovakian company, that's why there was a need of a translator, who could easily communicate the work between Slovak workers and French management. The translator was the author of this thesis.

The requirements on workers were following: in the team of 5 workers – 2 welders, 1 driver of manitou and other construction vehicles, one specialist capable of reading construction plans. Everyone needs to have a slinger‘s licence. Everyone knows locksmith and assembling works – how to use a grinder, hand tools, drills, welding machines in case of welders. Everyone is used to work in heights or tougher conditions.

4.3.3 Limitations of the team

Limitations are the factors, that restrict the possibilities of the team. For this project, there were these limitations identified:

- Budget – a specific budget was agreed for every work
- Time scope – a specific deadline was decided for the work
- French legacy – specific work conditions (see chapter 6. Work conditions)
- Dependence – dependence on other subontractors and suppliers
- Weather conditions – stormy, rainy or too hot weather makes the work impossible
- Communication – foreign workers (in our case Slovak workers) might be confused sometimes because of the language barrier
- Cooperation – intervention of other companies of the site can make the work difficult
- Factory faults – leak of dangerous gases, not coherent plans – changes in construction
- Client’s preference – sometimes client needs to support by switching to other work etc.

4.3.4 Phase review assumptions

Phase review assumptions are those factors, which we can consider as true ones for the project. If we want to omit the majority of risks, we have to name them and describe them. It concerns intern but also extern risks. By R. Keith Mobley, Principal SME in Life Cycle Engineering risk management is:“simply the identification, assessment and prioritization of risks, followed by a coordinated and economical application of resources to minimize or control the probability of occurrence and the impact of negative events, as well as to maximize the realization of opportunities. What

is considered a risk? Risks can come from uncertainty in financial markets, project failures, legal actions, regulatory liabilities, accidents, and natural disasters as well as simple human error.“[41]

For this project no specific risk management analysis (inputs, tools or outputs) was created by the management, however some risk measures are enroled in general (insurance, general emergency plans).

4.3.4.1.1 Risk sources

Risk sources are groups of possible risky situations (for example the unforeseen actions of subcontractors or suppliers, unreliable estimations etc.), which can influence the project in the bad way. Risk sources normally comprehend:

- Changes of requirement
- Faults or misunderstanding in the project
- Incorrectly defined or misunderstood job description
- Incorrect estimations
- Unqualified staff[42]

4.3.4.1.2 Adopting of the anti-hazardous measures

After identifying all the possible risks, it is necessary to adopt anti-hazardous measures. This arrangement is a preparation how to respond to potential threats:

- Prevention – minimalisation of the threat
- Decreasing of the risk – decreasing of the risk’s impact (insurance, use of new technology etc.)
- Accepting the risk
    - Actif: creation of the plan for problem solution
    - Passif: for example accepting lower incomes in case of overstepping the budget[43]

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[41] https://www.lce.com/What-is-Risk-Management-1263.html, 8.5.2019
. ŘEHÁČEK, Petr. *Projektové řízení podle PMI*. Ekopress s.r.o.. 2013, Praha 4. 1.vydání. ISBN 978-80-86929-90-3. Page 72,73.

[42] ŘEHÁČEK, Petr. *Projektové řízení podle PMI*. Ekopress s.r.o.. 2013, Praha 4. 1.vydání. ISBN 978-80-86929-90-3. Page 72,73.

[43] ŘEHÁČEK, Petr. *Projektové řízení podle PMI*. Ekopress s.r.o.. 2013, Praha 4. 1.vydání. ISBN 978-80-86929-90-3. Page 74.

4.3.4.1.3 Tools for anti-hazardous measures creation

- To procure – to procure or to buy goods inside the company is usually the best response to some risks. For example, with the strategy of implementation of new technology, we can foresee a contract with a firm, which has already an experience with this technology.
- Emergency plans – description of measures in case of risky situation
- Alternative strategy – we can prevent a hazardous moment by implemeting a new strategy
- Insurance[44]

[44] ŘEHÁČEK, Petr. *Projektové řízení podle PMI*. Ekopress s.r.o.. 2013, Praha 4. 1.vydání. ISBN 978-80-86929-90-3. Page 74.

5 Planning-budget, timing and quality of the project

After the phase of initiating we are ready for the second phase of project management and it‘s planning. In this phase we need to show where are we going and how can we achieve it. „The planning phase is when the project plans are documented, the project deliverables and requirements are defined, and the project schedule is created. It involves creating a set of plans to help guide your team through the implementation and closure phases of the project.“[45]

The subjects of the project planning are usually:

- **Scope of the project** – it is important to know in what measure we will plan the details, track and evaluate the scope of the project
- **Time** – we need to schedule the time – how detailed the plan would be in the measure of time
- **Expenses** – how are we going to track the expenses?
- **Quality** – how are we going to manage the quality of the product?
- **HR and other sources of the project** – teamwork, leadership etc.
- **Communication** – the project plan needs to include a communication plan, to be sure, that each party has the necessary information for their work
- **Risks** – see chapter 4.
- **Procurement** – what kind of subcontractors are we planning to cowork with?
- **Integration** – the head manager of the project needs to be sure all these aspects of planning cooperate together.

Goals of the project planning can be divided into:

- Priority – only very important and relevant goals make the part of the project planning
- Measurability: we need to be the very specific and understandable in defining the project goal. It is preferable to use numbers for better control – for example – lowering the expenses by 3%.
- Adequacy in:
    - Number of goals – a bigger number of goals is not optimal.

[45] https://opentextbc.ca/projectmanagement/chapter/chapter-8-overview-of-project-planning-project-management/, 3.4.2019

- Sources – human, financial, knowledge etc.
- The organisational development[46]

We divide the plans by the time and management:

Time

- Long-term projects – duration more than 5 years
- Mid-term projects – 1-5 years
- Short-term projects – less then 1 year

Management

- Strategic plans – made by chief management for long-term period
- Tactical plans – middle management for period of 1 year
- Operational plans – middle management and executive management for immediate problem solving[47]

The development of the plan is following:[48]

1. Get-to-know the strategic plans of higher management or company's vision
2. Collect all necessary information
3. Develop the plan or multiple variations of the plan. For time planning we can use the PERT and CPM analysis, for expense estimation the expense analysis etc.
4. Introduce the plan to all involved parties
5. Modify or send for validation

5.1 Scope planning

„Each project's product and/or service is unique and requires its own careful balance of practices, processes, tools and techniques etc. to ensure the required work is completed as agreed upon by key project stakeholders. The sum of these along with the product and/or service to be delivered by the project is known as the project's scope. Getting key parties to agree upon what is the scope of the project's work is known as project scope planning.“[49]

[46] DONNELLY,J.Jr; GIBSON J.L.; IVANCEVICH J.M. *Management.* Grada Publishing. ISBN 80-7169-422-3.
[47] VEBER,J. *Management. Základy, moderní manažerské přístupy, výkonnost a prosperita*. Praha, Management Press. ISBN 978-80-7261-200-0.
[48] https://www.usability.gov/how-to-and-tools/methods/develop-plan.html, 3.4.2019
[49] https://www2a.cdc.gov/cdcup/library/pmg/other/scp_description.htm, 3.4.2019

5.1.1 Categories of requirements of involved parties

For better understanding, what the client desires form us to achieve or to respect, we have to know what kind of demands we can meet. The categories of requirements of involved parties can be classified as follows:

- Business requirements – benefits for business during or after the project; a reason why the project is being realised
- Requirements of the involved party – demands of the concrete involved party
- Requirements for problem solving – description of functions or properties of the product, service or final result. We can segment them by:
  - Functional requirements – they describe the quality of the final product
  - Non-functional requirements – they complement the functional requirements. They describe another necessary qualities of the final product – for example we speak about the safety requirements, performance requirements, reliability r. etc.
- Transitional requirements – temporary capabilities which are in connection to the final product.
- Project requirements – or more precisely the demands on project management.
- Quality requirements[50]

5.1.2 Requirements Traceability Matrix

The requirements traceability matrix or RTM is a tool which helps us track all the demands of client and other involved parties. It helps us also to see if we already met all the client's requirements and record them in time.

Table 3 Requirements traceability matrix

Extension and rehabilitation of the factory SUEZ									
Type of requi re-ment	N u m be r	Require-ment descrip-tion	Source /Reque stor	Org/de-part-ment	Business Justifica-tion/need	W B S de li-ve ra bl e	Test Strategy	Sta-tus	Com men ts

[50] DOLEŽAL, J. KRÁTKÝ, J. *Projektový management v praxi*. Grada publishing, 2017. ISBN 978-80-247-5693-6.

Involved party r.	1	Use of H&S features	V.Blondel/APAVE	workers	Better representation of the company, safer environment	Task X	Informing all the workers and tracking their activity	In progress	familiarising with French law
Transitional r.	2	No fire in silo area	SUEZ	workers	Ammonia environment, health danger	Task Y	Informing all the workers, prevention of masks and other kind of tools for works on silo	In progress	familiarising with impact of dangerous gases on human's health
Project r.	3	Area cleaning	T.Mathonnet/CNIM	workers	Better working place + representation of the company	Task Z	Providing time in the end of the shift and the tools for cleaning	In progress	Bigger cleaning each Tuesday
Quality r.	4	Quality of bolts tightening	site supervisor	workers	Quality need	Task A	Regular control of the site	In progress	

Business	5	Tracking of nonconformities	head manager of the site+director of EFM	assistent of project manager	Business requirements - delay clarification	Task B	Every modification reported	Done	Send to head manager every Monday morning

Source 2 Karolína Slabá

In the chart of Requirements Traceability Matrix we can see what was the requirement – for example the tracking of nonconformities, who demanded the requirement (head manager), to who was the task sacrified (assistent), what was the business need – in this case the explication of caused delay, where can we find it in the work breakdown structure (task B), what strategy are we going to implement – every modification reported, and what is the status of the requirement plus possible comments.

5.1.3 Scope plan

The scope plan is showing us what is the scope of the works in the project Schweighouse.

Table 4 Scope plan

EFM Steel			
Project scope			
Project name	Extension and rehabilitation of the factory SUEZ	**Project #**	545
Project description and background			
The analysed project is from specific area of industry, concretely the extension and rehabilitation of the factory of the company SUEZ in Schweighouse-sur-Moder in Alsace, France. The client ordered new airfilter for lowering the emissions produced by the factory. In the project are added also complementary works as refurbishment of the silos or piping works.			
Project scope			
Assembling, mounting and locksmith works			
Boiler smithing works			
Piping works			
Delivery of the silo Refiom			

Complete refurbishment of the silo area	
Mounting of the steel construction	
Positionning of all the machines and connection between them	
Supervision of the works	
Respect of time and budget	
High level requirements	
Respecting the Health and Safety conditions	
Respecting the time schedule	
Reporting the work	
Respecting the date of factory launching	
Deliverables	
EFM Steel Luxembourg	Delivery of the conveyor + silo Refiom, head office
Grindweld	Slovakian mounting company, subcontractor
VIZ agency	Intermediary, communication between EFM+workers
Würth	Delivery of utilities necessary for work
Orexad	Delivery of utilities necessary for work
HILTI	Delivery of utilities necessary for work
CNIM	Design office, head management of the site
Urban Dumez	Civil works
Motostal Siedlce	Steel construction fabrication
SUEZ	client

Source 1 Karolína Slabá

In the scope plan we can see the description of the project, what is the project scope and what are the high level requirements with example of deliverables.

5.2 Work Breakdown Structure

After describing the scope of the plan, we are ready for the WBS. The Work Breakdown Structure is a method of dividing complex projects to simpler and manageable tasks. Normally the managers use this method for simplifying the whole plan into smaller tasks. The tracking of the tasks becomes easier, as the goals are more specified.

„Following are a few reasons for creating a WBS in a project:

- Accurate and readable project organization.
- Accurate assignment of responsibilities to the project team.
- Indicates the project milestones and control points.
- Helps to estimate the cost, time and risk.

- Illustrate the project scope, so the stakeholders can have a better understanding of the same."[51]

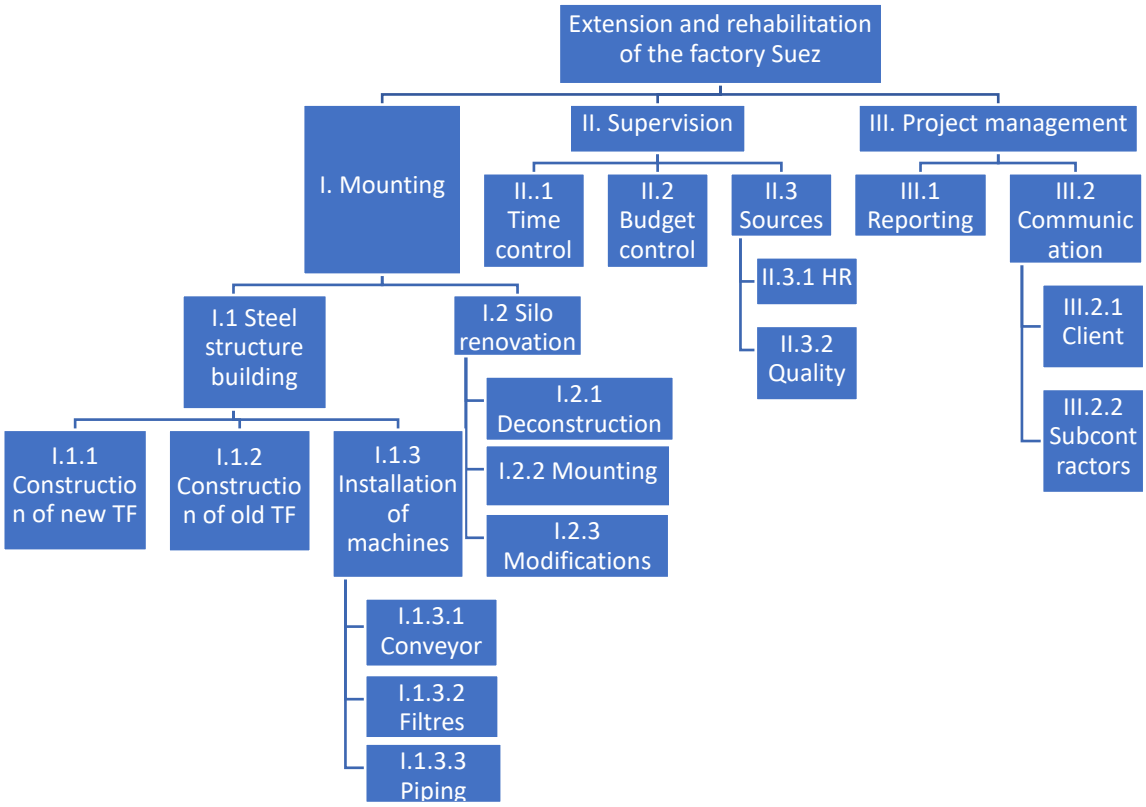
In the development of the WBS there are no strict rules. We can follow the rule of 8/80, which means, that the task mentionned in the WBS shouldn't be smaller than 8 hours, or bigger than 80 hours of work. The creation of the WBS is made by WBS diagram.

5.2.1 WBS diagram

„In a WBS diagram, the project scope is graphically expressed. Usually the diagram starts with a graphic object or a box at the top, which represents the entire project. Then, there are sub-components under the box. These boxes represent the deliverables of the project"[52]

For the project of extension and rehabilitation of the factory SUEZ no WBS diagram was made. This diagram is for ilustration.

Figure 2 Work Breakdown structure diagram



Source 4 Karolína Slabá

[51] https://www.tutorialspoint.com/management_concepts/work_breakdown_structure, 8.6.2019
[52] https://www.tutorialspoint.com/management_concepts/work_breakdown_structure, 8.6.2019

In the following diagram we can see how the works of extension and rehabilitation of the factory SUEZ were divided into three main fields – mounting, supervision and project management. These fields were divided into other subchapters as steel structure building or silo renovation. Each work was specified with a number.

5.2.2 WBS dictionary

The group of smaller tasks or the work packages, which makes part of WBS is called WBS dictionnary. They are clearly bordered and separable. In other words we can treat them independently for every other work package. Projectmanagement.com describes the WBS dictionnary as: „A document that provides detailed information about deliverables, activity and scheduling of each component in the Work Breakdown Structure (WBS). The WBS Dictionary describes each component of the WBS with milestones, deliverables, activities, scope, and sometimes dates, resources, costs, quality.“[53]

Table 5 WBS dictionnary

WBS Dictionnary				
Work package name	Modifications	**Work package number (WBS)**	I.2.3	
Description: Modifications on the silo Refiom			**Expenses**	
			x	
Milestones: refurbishment before 27th of May			**Work volume**	
			x hours	
ID	**Task**	**Source/labour intensity**	**Duration**	**External expenses**
1.A	Fluidization ring	Kalužník/1 day	1,5 day	no
1.B	Piping support	Kalužník/3 hours	2 hours	no
1.C	Probe placement	Kalužník/2 days	2,5 days	lack of material, charge on CNIM's account
1.D	Engines fixation	Kalužník/1 day	2 days	lack of material, charge on CNIM's account
Acceptance info		Everything accepted by the maintenance before the milestone		
Technical info		Ammonia environment, strict H&S conditions		

Source 5 Karolína Slabá

The work breakdown structure dictionnary shows the specification of tasks mentionned in the work breakdown structure. We can find the concrete tasks, with

[53] https://www.projectmanagement.com/wikis/397396/WBS-Dictionary, 6.4.2019

responsible person and specific time but also the duration of the task and if there are some specific expenses.

5.3 Project schedule development

Project schedule development means to determine the start and the end of the project. If these datas won't be realistic, it is possible, that the project will not be finished as planned.

5.3.1 Methods

5.3.1.1 Matematical analysis

Matematical analysis includes the calculation of the teoretical data of the soonest possible and very last admissible start and end date of the project activities. The final datas are not showing us the schedule of activities but recommendation, when each activity should be planned with a regard on sources and other restrictions. The most popular techniques of matematical analysis are:

5.3.1.1.1 Critical path method

„Critical path method (CPM) is a resource-utilization algorithm for scheduling a set of project activities by defining the critical path. The method is completed by identifying the longest stretch of dependent activities and measuring them from start to finish."[54]

Once we have defined the critical path – the longest and the most unflexible path possible, we determine the first activity of our project and its longest duration. Next step is to determine other works depending on the first activity. For example, the activity A (as shown in picture 1), to excavate, will have the longest possible duration of 2 weeks. Activity B, to lay the foundation is dependent on the end of activity A.

[54] https://www.wrike.com/blog/critical-path-is-easy-as-123/, 30.6.2019

Figure 3 Critical Path Method Example

Reliable Construction Company Example

- Activity list for the Reliable Construction Co. project

Activity	Activity Description	Immediate Predecessors	Estimated Duration
A	Excavate	-	2 weeks
B	Lay the foundation	A	4 weeks
C	Put up the rough wall	B	10 weeks
D	Put up the roof	C	6 weeks
E	Install the exterior plumbing	C	4 weeks
F	Install the interior plumbing	E	5 weeks
G	Put up the exterior siding	D	7 weeks
H	Do the exterior painting	E,G	9 weeks
I	Do the electrical work	C	7 weeks
J	Put up the wallboard	F,I	8 weeks
K	Install the flooring	J	4 weeks
L	Do the interior painting	J	5 weeks
M	Install the exterior fixtures	H	2 weeks
N	Install the interior fixtures	K,L	6 weeks

PERT/CPM-3

Source 6 https://slideplayer.com/slide/4168478/

5.3.1.1.2 Graphical Evaluation and Review Technique

GERT or graphical Evaluation and Review Technique is another mathematical method in project management. GERT „allows for probabilistic treatment of both network logic and activity duration estimates. GERT is mainly used on project activities that are only performed in part, as well as those activities that may be performed more than once.“[55]

For example, in constructions, we know that we will install the electricity as each floor is being done. GERT helps us to count the entire process of installing the electricity progressively instead of waiting when the whole construction is being done.

5.3.1.1.3 Program evaluation and Review Technique

Program evaluation and Review Technique or PERT is other method of matematical analysis. „The aim of the **PERT** models is such an arrangement of activities that would ensure a compliance with the deadline of the project with sufficiently high probability. The basic difference from the CPM is, that the duration of the activity is not

[55] https://www.linkedin.com/pulse/20140618054203-58881633-cpm-pert-and-gert-retrieved-from-web/, 30.5.2019

precisely known but it is given only with a certain probability. This duration is not constant but a random variable with a certain probability distribution.“[56]

Even though the CPM and PERT methods are very similar, the PERT time estimating requires three estimates for each activity:

- MLT = mostly likely time
- OT = optimistic time
- PT = pessimistic time

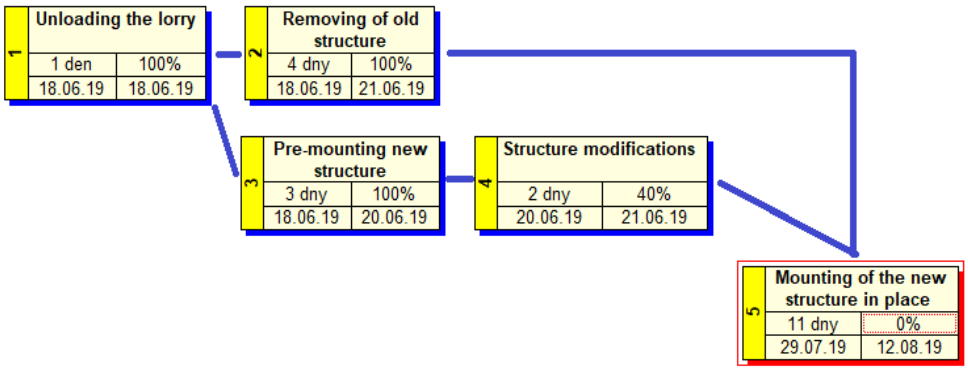
Once we have all these data, we can use the PERT average formula:

$$\frac{OT + 4 \times MLT + PT}{6}$$

When we have counted all the estimated times of the project we can display them on the S curve. This S curve helps us to easily see all three estimates.

Example of PERT chart

Figure 4 Pert chart example



Source 7 Karolína Slabá

On this PERT chart we can see the sequence of works. For example, for tasks 2 and 3 we need to have done the task 1 – unloading the lorry. Whenever the lorry is unloaded, we can do two tasks in the same time – remove the old structure and pre-mounting new structure in the same time. When the tasks 2,3 and 4 we can do the task 5, mounting on the new structure in place.

[56] https://managementmania.com/en/pert-method, 30.5.2019

5.3.1.2 Time shorthening

Time shortening is a special case of a matematical analysis, which is seaking for the ways how to shorten the time schedule of the project without changing its scope. Time shortening concerns for example:

- Crashing – with this technique the changes of costs and deadlines are being analysed. The goal is to find how to achieve the maximum shortening with minimum costs.
- Fast tracking – is a parallel execution of activities, which could be normally done one after another. This technique usually leads to a lot of modifications.[57]

5.3.3 Outputs

5.3.3.1 Gantt chart

The Gantt chart is a tool, which helps us track the progress of the work and also it shows us the whole plan of the project. It helps us also to check the deadlines, milestones and hours worked.[58] The simple version of this tool which represents multiple works in time is called Gantt diagram. If we add the dependencies of the following works on each other, we create a Gantt chart. The dependencies are:

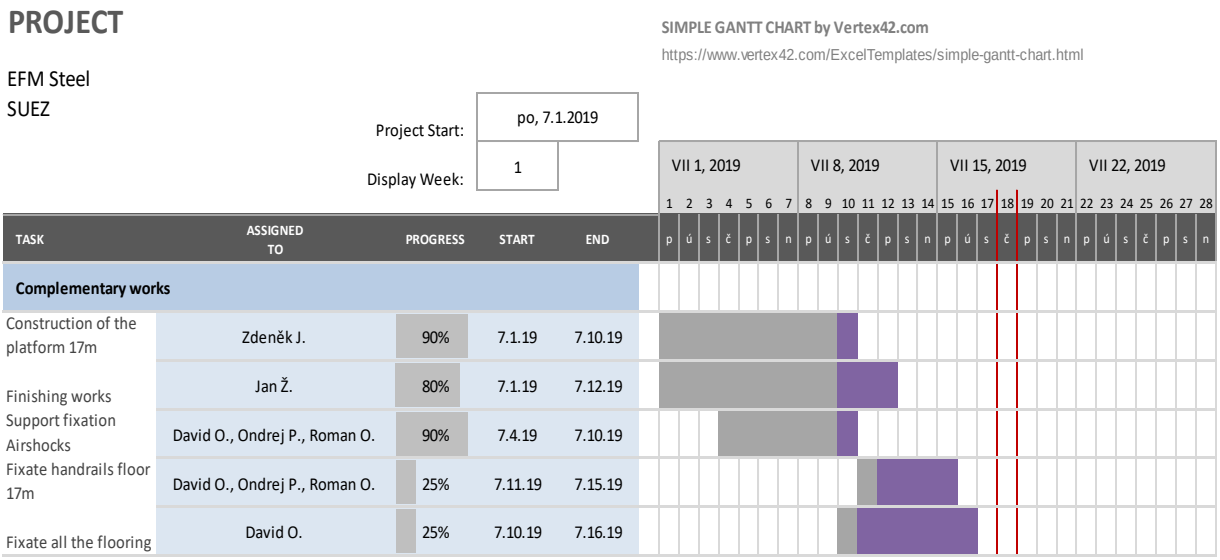
- Finish to start (FS) – one task needs to be finished before other task starts
- Start to finish (SF) – one task starts only if other is finished
- Finish to finish (FF) – one task finish only if other is ending aswell
- Start to start (SS) – one task starts only if other task has also started

5.3.3.1.1 Example

In the following example the author of this thesis tried to show one of the weeks of complementary works. The original plan with the Gantt chart was made by company CNIM. The part of the plan is showed for example in anexes (anexe n˚1).

[57] https://www.simplilearn.com/fast-tracking-vs-crashing-article, 30.5.2019
[58] https://www.teamgantt.com/free-gantt-chart-excel-template, 29.6.2019

Figure 5 Gantt chart example



Source 8 Karolína Slabá

In this chart we can see the planified tasks for two weeks of work. Each task was given to a concrete worker, for example the construction of the platform 17m to Zdeněk J.. Zdeněk J. has time from 1.7.2019 to 10.7.2019 and already nearly finished, what we can see and track in the progress column.

5.4 Resource planning

We have already described the schedule and now it's a time to define the plan of resources. The question for this part is - who is going to do all the work? How? In this chapter, we have to specify:

- Type of team you'll need
- Roles and key responsibilities for each team member
- Number of people required to fill each role
- What equipment they'll need and its purposes
- Job locations or meeting rooms required[59]

5.4.1 Team

To be sure that everything is going to work in the best way, we have to make attention in composition of our working team. The team needs to be made by different personnalities. In a varience of personnalities and caracters we can discover a huge advantage. The perfect team by management professionals is made by 7 different personnalities, which are having roles of:

[59] https://www.projectmanager.com/software/use-cases/resource-planning-software, 3.5.2019

1. The visionnary – usually the leader. The visionnary mentors and coach others to better performance. He/she is having excellent communicational skills, drive and is highly respected by the other team members.
2. The strategist – he takes the vision of the leader and transform it to real strategic plan. He is more concentrated on nuts and bolts than abstract ideas.
3. The communicator – is the person, who is naturaly very friendly and highly oriented on people. This person is always chatting somewhere and it might seem like he is not working but actually he is simplifying the work to others by making sure the important message was spoken to everyone.
4. The analyst – is someone, who might be seen as the most pesimistic person in the team, but he is the true problem solver. He sees the problem and solves it before anyone else can even notice. This brings him a true value and respected place in the team.
5. The administrator – complements the analyst. He is excellent in tracking the work and making sure that everyone is working.
6. The worker bee – someone, who is ready to transform the idea into action, if he has the clear instructions.
7. The innovator – always brings new ideas even though they are not welcomed.[60]

5.4.2 Roles and key responsibilities

We have different roles and responsibilities in the work. For selecting the best person for each task we can use the RASCI Matrix:

R – responsible – The person which is charged to execute the task.

A – accountable – Person which has the responsibility to authorize certain task or group of tasks.

S – support – this person helps the Accountable to track the task or group of tasks and their realization.

C - consulted – person, who has usually nothing to do with the task but needs to be consulted. This person is normally a specialist who judge the process or decision making.

[60] https://statushero.com/blog/7-types-of-people-you-need-on-your-team/, 27.5.2019

I – informed – this person is frequently informed about the progress of the team by reports or meetings.[61]

RASCI in the project Schweighouse:

R – workers, employees

A – foremen, site manager

S – assistant of the site manager, office of EFM Steel France

C – director of the company, sales managers

I – client, site manager

5.4.3 Quantity required

Required quantity of sources can be showed with the tool called resource histogram.

5.4.3.1 Resource histogram

„The resource histogram allows us to look at the individual resources in a schedule and the Gantt chart at the same time. By looking at these two displays simultaneously, we can make intelligent decisions regarding the use of the resources. The resource histogram shows the amount of use and availability for the resource, and the Gantt chart shows the activities that the resource is scheduled to be working on.“[62]

Table 6 Resource histogram data

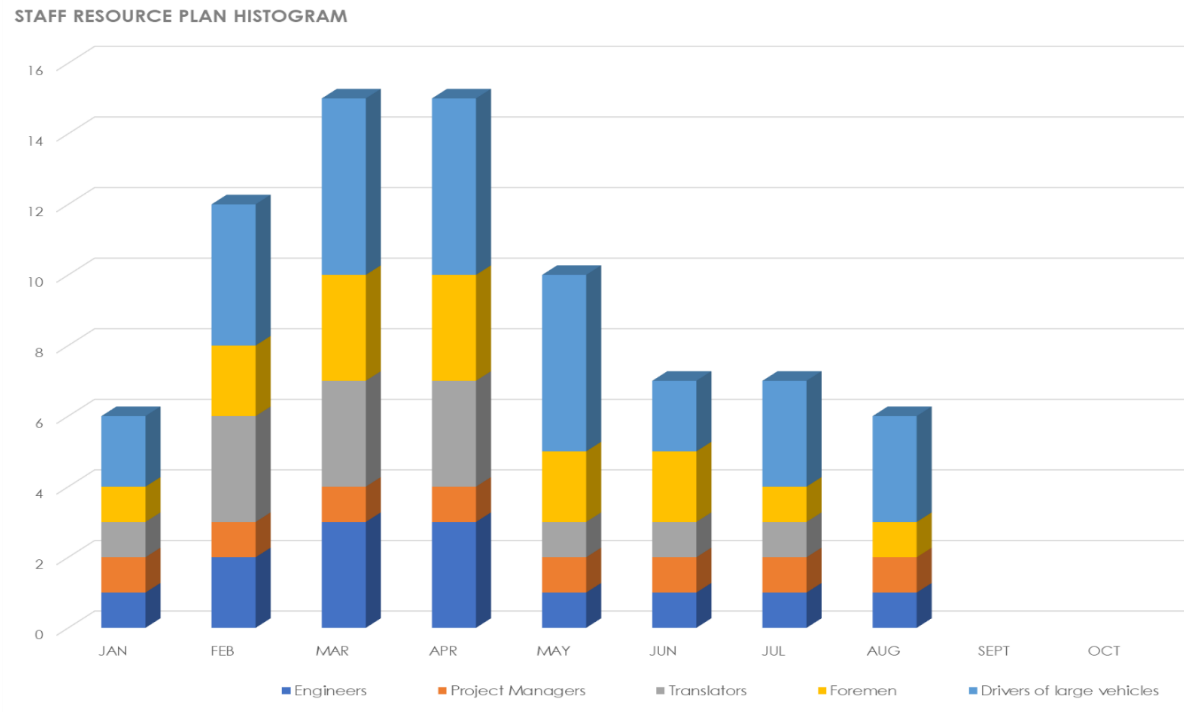
RESOURCES	MONTHLY ALLOCATION												
JOB TITLE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Engineers	1	2	3	3	1	1	1	1					13
Project Managers	1	1	1	1	1	1	1	1					8
Translators	1	3	3	3	1	1	1	0					13
Foremen	1	2	3	3	2	2	1	1					15
Drivers of large vehicles	2	4	5	5	5	2	3	3					29
Welders	2	6	6	6	6	3	3	2					34
													0
TOTAL HEADCOUNT	8	18	21	21	16	10	10	8	0	0	0	0	112

Source 9 Karolína Slabá

[61] https://managementmania.com/cs/matice-odpovednosti-rasci, 28.6.2019

[62] https://flylib.com/books/en/4.107.1.44/1/, 29.6.2019

Figure 6 Resource histogram



Source 10 Karolína Slabá

In this histogram we can see what sources were planified for each month. For example, for the first month, January, there is planified one engineer on the site, one project manager, one translator, one foreman, two drivers of large vehicles and two welders. The peak is in March and April, when the project requires totaly 21 people on the site.

5.4.4 Equipment required

The equipment needed is listed in the contracts with the subcontractors what it concern the hand tools and basic work machines. Company CNIM guarantees the vehicles and specialised equipment + all the sanitary facilities with offices. Company EFM Steel is in charge of all the consumable material.

5.4 Budget planning

5.5.1 Inputs

5.5.1.1 Charge per unit

It is necessary to know the charge per unit, for example the charge of worker per hour or the cost by kilogram of some material. In order to prevent the data of analysed company, the author decided to don't show the costs per unit of named companies.

5.5.1.2 Estimating of activity duration

Top-Down Estimating Method

For estimating of the duration of some activity we can use the **Top-Down Estimating Method**. „Top Down estimating is a project estimating technique whereby the overall project is estimated first, and individual tasks are apportioned from it. You start from the top of the pyramid and work downwards.“[63] This budgeting type of project occurs when there is fixed budget. This method is opposite to the Bottom-Up method.

Bottom-Up Estimating Method

Bottom-Up method is to create the budget based on each little task and its cost. All the tasks are then counted into the complete budget.

This analysed project used the method of Bottom-Up, since there were estimated times of each smaller task.

Method Monte Carlo

„Monte Carlo simulation furnishes the decision-maker with a range of possible outcomes and the probabilities they will occur for any choice of action. It shows the extreme possibilities—the outcomes of going for broke and for the most conservative decision—along with all possible consequences for middle-of-the-road decisions.“[64]

5.5.1.3 Historical context

Information about costs are usually available in following sources:

- Information about projects – one of the organisations working on the project can have in disposal information about previous projects
- Commercial databasis
- Expert knowledge of project team – project team collects useful information from other projects

5.5.2 Methods

5.5.2.1 Estimation based on similarities

For estimation based on similarities the project management team uses the previous projects and the information from it. This method is usually not so expensive, however it is the least accurate.

5.5.2.2 Parametric modelling

„Parametric estimating, a more accurate technique for estimating cost and duration, uses the relationship between variables to calculate the cost or duration.

[63] https://www.projectengineer.net/top-down-estimating-for-the-pmp-exam/, 7.7.2019
[64] https://www.palisade.com/risk/monte_carlo_simulation.asp,7.7.2019

Essentially, a parametric estimate is determined by identifying the unit cost or duration and the number of units required for the project or activity. The measurement must be scalable in order to be accurate.“[65]

5.5.2.3 Counting-up assumption

This technique uses the particular tasks for estimation of costs. By counting-up the tasks we can estimate the cost of the whole project.

5.5.3 Outputs

5.5.3.1 Estimating of costs

Cost assessments are quantitative estimations of presumable costs needed for finishing of the project. There has to be done estimations for all the sources, mostly – salaries, material, and special categories as monetary expenses. They are usually counted in units – for example 1 hour of work for salaries, 1 kg of material etc.

Example:

1Kg of steel – market price around 1,2 euros

1 hour construction worker – market standard 12 euros netto

1 hour construction worker with specialisation – market standard 15 euros netto

5.5.3.2 Complementary information

Complementary information after cost estimation should include:

- WBS or description of the work scope
- Documentation for estimation – how was the estimation realized?
- Documentation of all the assumptions

5.5.3.2 Cost management plan

Cost management plan describes, how all the cost differences are going to be solved. The costs will be in following categories:

Fixed Costs: €xxx,xxx.xx

Material Costs: €xxx,xxx.xx

Contractor Costs: €xxx,xxx.xx

[65] https://www.linkedin.com/pulse/20141107215651-36477877-analogous-vs-parametric-estimating/, 9.6.2019

Total Project Cost: €xxx,xxx.xx

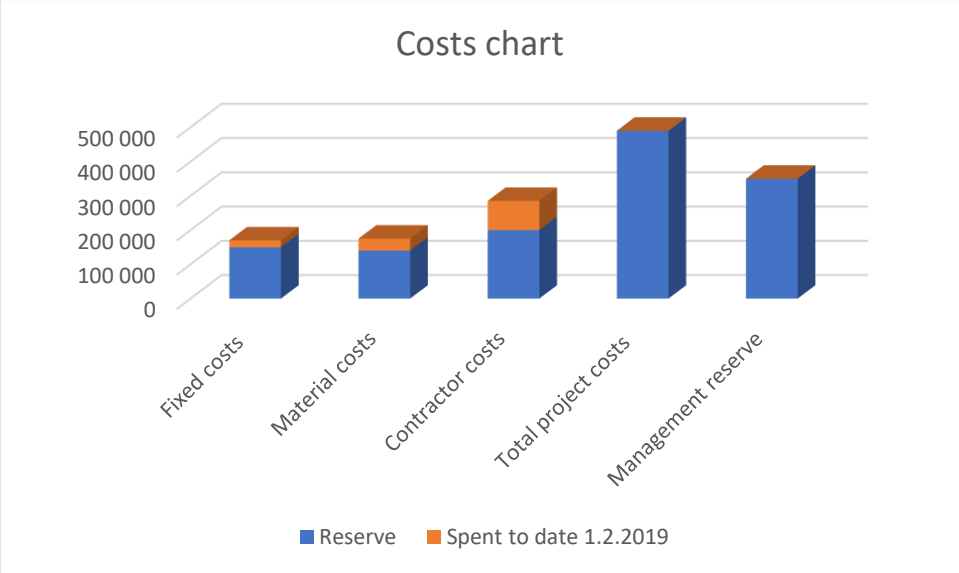
Management Reserve: €x,xxx.xx[66]

Table 7 Cost chart data

	Reserve	Spent to date 1.2.2019
Fixed costs	150 000	20 000
Material costs	140 000	35 000
Contractor costs	200 000	85 000
Total project costs	490000	
Management reserve	350 000	
Budget information is only for illustration.		

Source 11 Karolína Slabá

Figure 7 Cost chart



Source 12 Karolína Slabá

On this cost chart we can see how much money we have divided into fixed costs, material costs and contractors cost. The column is indicating the total amount of money, the orange colour what have we spent to date 1.2.2019 and the blue colour the reserves that we can still draw. In the last two columns we can see the total project costs and the very last column shows us the complete amount of reserves.

[66]https://www.projectmanagementdocs.com/template/project-planning/cost-management-plan/#axzz5v6v6LjmY, 3.7.2019

5.6 Procurement planning

„Procurement planning is the process of deciding what to buy, when and from what source. During the procurement planning process the procurement method is assigned and the expectations for fulfillment of procurement requirements determined.“[67]

5.6.1 Inputs

1. List of scope requirements – see chapter 3.1.2
2. Description of the project
3. Source for procurement – there need to be a specialist or person responsible for procurement
4. Market conditions – we need to consider in the planning also the conditions and real situation of the market in the moment
5. Other planning inputs – we need to consider also other plans in out decision-making, as the quality plans, risk management etc.
6. Restrictions – are we limited by some sources? Budget? Time?
7. Assumptions – what are we considering as true, real or sure?[68]

5.6.2 Tools and methods

1. Analysis of our forces vs. Purchase – we need to consider, if we are capable to create the good ourselfs or if it’s better to buy it or rent
    a. Case study: no delivered fixture to the site

       Consideration purchase: the estimated cost would be for sure paied by the client or the company who did not deliver the fixtures. No loose of the working hours for fabrication.

       Consideration fabrication: possible loose of working hours for the fabrication on the site. No waiting time for new delivery (usually 2 weeks and more).

       Technical specification: easy fabrication of new fixtures, material available on the site

       Decision: fabrication of the new fixtures after the consultation with the client – need of chosing less time demanding decisions. More profitable.
2. Professional judgement – bigger purchases or procurement planning needs to be judge by a professional

[67] https://procurementclassroom.com/procurement-planning-and-the-procurement-plan-why-are-they-important/, 3.5.2019

[68] ŘEHÁČEK, P. Projektové řízení podle PMI. Ekopress s.r.o. 2014, Praha 4. ISBN 978-80-86929-90-3. Page 78.

3. Choise of contract – contracts can be divided by:
    a. Fixed price for a well described product
    b. Agreements based on the supplier's real price.
    c. Agreements based on the unitary price – for example the hour costs of workers.[69]

5.6.3 Outputs

- Procurement plan – needs to describe, how are we going to buy or rent during the project. We need to schedule:
    - What kind of contracts are we going to use?
    - Who is going to make approximate estimations if we don't know the price.
    - Are there any resctrictions in procurement?
    - How are we going to coordinate the procurement with other aspects of the planning?
- Statement of work SOW – „A Statement of Work (SOW) is a document within a contract that describes the work requirements for a specific project along with its performance and design expectations. The main purpose of the SOW is to define the liabilities, responsibilities and work agreements between two parties, usually clients and service providers."[70] This statement of work can be modified and changed during the project. For example the supplier can offer a more effective way of delivery or a cheaper product or a better deal.

5.6.4 Procurement plan

Procurement plan shows us the product, good or service; who is responsible for the procurement and estimation of the time spent for the procurement.

[69] ŘEHÁČEK, P. Projektové řízení podle PMI. Ekopress s.r.o. 2014, Praha 4. ISBN 978-80-86929-90-3. Page 79.
[70] https://www.villanovau.com/resources/contract-management/what-is-statement-of-work/, 31.5.2019

Table 8 Procurement plan

Procurement plan					
Product, good or service	**Responsible person**	**Procurement Method Selected**	**Quantity/Man hours requested**	**Required Delivery Date**	**Delivery Location**
Platform	T.Mathonnet	fixed price	1	23.07.2019	Schweighouse-sur-Moder
Conveyor	B.Changivy	fixed price	1	20.05.2019	Schweighouse-sur-Moder
Railing	T. Mathonnet	supplier's real price	12pieces	10.07.2019	Schweighouse-sur-Moder
Cutting discs	K. Slabá	supplier's real price	50	01.07.2019	Schweighouse-sur-Moder

Source 13 Karolína Slabá

In this chart we can see what material or goods are we expecting on which date of delivery. We can read from the table also who is the responsible person for the procurement and what kind of procurement method we have selected.

5.7 Quality planning

„A quality plan is a document, or several documents, that together specify quality standards, practices, resources, specifications, and the sequence of activities relevant to a particular product, service, project, or contract.“[71] Quality plans should define:

- Goals to be reached (for example, characteristics or specifications, uniformity, effectiveness, aesthetics, cycle time, cost, natural resources, utilization, dependability, and so on)
- Specific documented standards, practices, procedures, and instructions to be applied
- Suitable testing, inspection, examination, and audit programs at appropriate stages
- A documented procedure for changes and modifications to a quality plan as a process is improved

[71] https://asq.org/quality-resources/quality-plans, 31.5.2019

- A method for measuring the achievement of the quality objectives
- Other actions necessary to meet the objectives

In the beginning of this project no quality requirements in accordance with norms ISO or others were scheduled. Following requests by the client on the quality were:

- Assembling tolerances – norm EN ISO 13 920
- Assembling by welding – requirement of the permission for the work with fire
- Welding piping – control of welding will be done by professional in the end of the project
- Assembling by nuts and bolts – min. diameter 12, class 8.8 or HR, galvanized
- Steel construction – all the material used is new
- Prevention of corrosion – all the work of cutting or welding is galvanized

5.8 Communication planning

As last we need to develop a communication plan. „A communication plan is your road map for getting your message delivered to your audience. It's an essential tool for ensuring your organization sends a clear, specific message with measurable results."[72]

In the communication plan we need to describe, who is responsible for which communicational chanel. Also, scheduling what time exactly or what date it is necessary to renew or to pass the information can help to improve the communication.

In communicational plan we can also track all the reports made by higher and middle management. Reports are usually made once a week, a month or in bigger projects once a year. Company EFM Steel didn't have made any communicational plan neither report, so the following communication planning is illustrational.

[72] https://www.axiapr.com/blog/6-steps-to-creating-an-effective-communication-plan, 16.6.2019

Table 9 Communication plan

Communication plan					
Project	Extension and rehabilitation of the factory SUEZ	**Made by:**	EFM Steel	**Date/time of last actualisation**	13.01.2019
Recipient	**Communication goal**	**Key information**	**Communicational chanel**	**Feedback**	**Responsible person**
workers	safe work	Respecting Health and Safety conditions	each Tuesday - safety minute	report to APAVE	assistent
client	clear communication	Reporting the advancement of work	Thursday meeting with client	report made by CNIM	head manager
			Everyday communication - little meetings - morning and afternoon	direct feedback	management
management	compact management	transmitting work	each start and ending of work shift	made by head manager	head manager

Source 14 Karolína Slabá

In this table we can see the communicational plan in the company EFM Steel. For example in the first line we have specified who is the recipient of the information – in this case the workers. What is the communicational goal – for example the safe work and the fact that nobody is hurt during the works. Key information would be respecting of Health and Safety conditions. We have also scheduled, that we are going to communicate this information each Tuesday during the meeting „Safety minute“. We need to report after the transfered information to the company APAVE, which is responsible for the Health and Safety in the project in Schweighouse. The report will be made by the assistent and after signed by all the workers who were instructed.

5.8.1 Communicational technologies

As a communicational technologies no tool was chosen. The project manager decided to use the email for communicational channel, even though there were proposed some other technologies, as Bitrix24 – a software tool for tracking the work, Monday.com – new project management software usefull in many fields of project management or Google (Hangouts, Drive, Groups, Classroom etc.)

6 Executing – effective management and leadership of human resources

6.1 Decision making

In decision making it is very important to define the difference between Decision-making problem and decision-making process. A decision-making problem is any kind of problem, which has multiple solutions. A decision-making process is the whole process of treating the problem.

The development of the decision-making process is influenced by:

- Specific problem
- Decision-making conditions
- The decision maker

We distinguish two types of problems:

- Programmed ones – problems which are being resolved repeatedly, usually in lower management
- Non-programmed ones – new problems, which were not identified yet

The decision-making process is normally under following conditions:

- Decision making with certainty – we know in advance all the impacts of our decision-making. Decision making with certainty is usually made by the lower management.
- Decision making with risk and uncertainty – usually a responsibility of higher management. We don't know in advance the impact of the decision-making.[73]

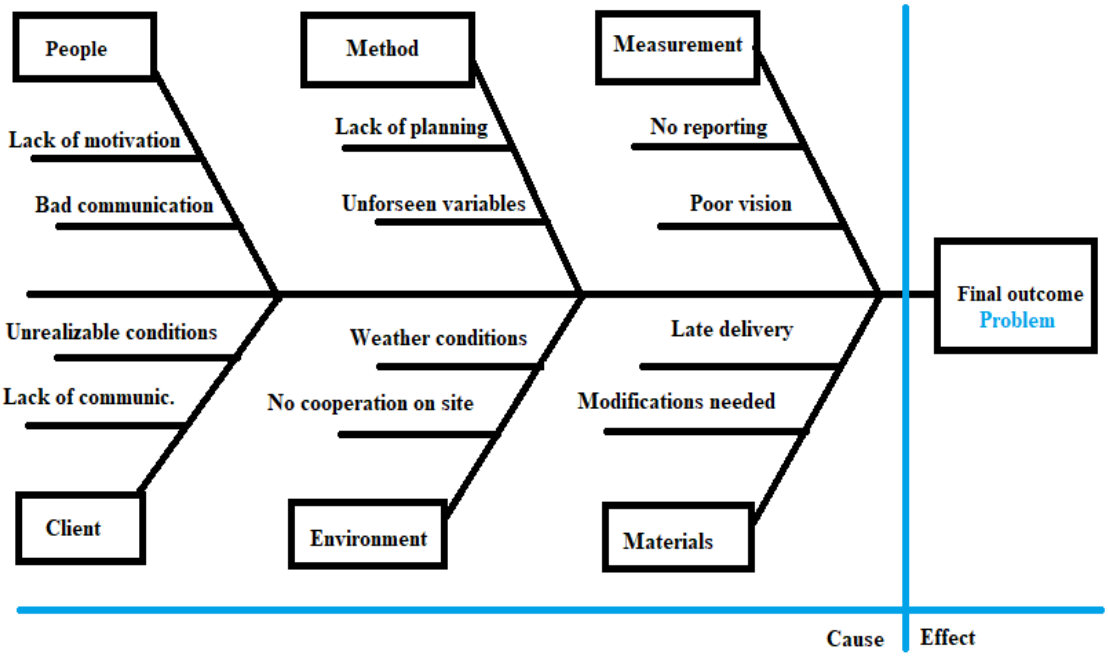
6.1.1 7 phases of the decision-making process[74]

1. Identify the decision-making problem
2. Analysis and formulation of the problem – for the proper analysis we can use the
   a. **Ishikawa diagram –** Ishikawa diagram or the fishbone diagram was made by Professor Kaoru Ishikawa in 1960's. „The fishbone diagram is also well known as cause – effect diagram. It helps to show the correlations between an effect and its multiple happening causes. Fishbone diagram shows the

[73] https://www.altaxo.cz/provoz-firmy/management/rady-pro-manazery/rozhodovaci-proces, 13.5.2019
[74] FOTR, J.; DĚDINA, J. Manažerské rozhodování. Ekopress. Praha 4, 1997. ISBN 80-901991-7-8.

possible causes of a specific event or a problem. It also illustrates the possible causes of a particular problem by sorting and relating each causes using a classification scheme. In general, it is a analysis of the impact that cause a particular outcome observed phenomena."[75]

Figure 8 Ishikawa chart



Source 15 Karolína Slabá

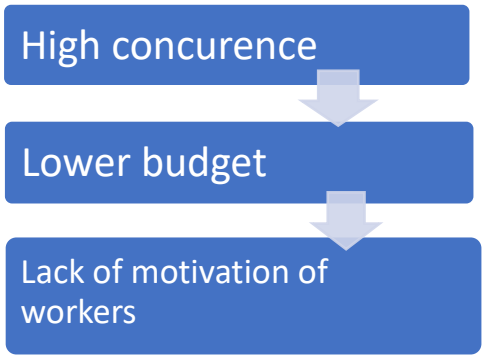
In this Ishikawa diagram we can see in the boxes main fields where the possible causes can appear – people, methods, measurement, client, environment and materials. The causes for people can be for example lack of motivation or bad communication. This all leads to the final outcome – possible problem.

b. **Causal chain diagram –** supposition of this diagram is, that every consequence has only one causation.

In this diagram we can see the simple way of the one causation. For example the high concurence unfortunately pushes down in the industry the prices of units to minimum, which means lower budget, which can cause the lack of motivation of the workers, because they are not sufficiently remunerated.

[75] SEPTIAWAN, B. D.; BEKTI, R. *ANALYSIS OF PROJECT CONSTRUCTION DELAY USING FISHBONE DIAGRAM AT PT. REKAYASA INDUSTRI.* Journal of business and management. Vol. 5, No. 5, 2016: 634-650.

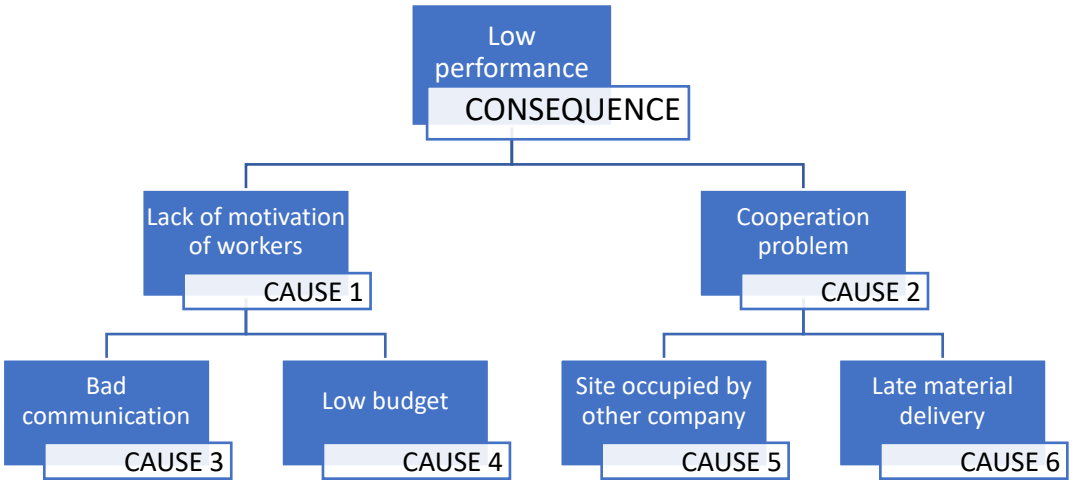
Figure 9 Causal chain diagram



Source 16 Karolína Slabá

c. **Causal tree analysis** – similar to causal chain, but works with multiple causations

Figure 10 Causal tree analysis



Source 17 Karolína Slabá

In this diagram of causal tree analysis we can see that the consequence can have more causes. For example, the low performance can be caused by the lack of motivation of workers (cause 1), which can be caused by the bad communication (cause 3) and low budget (cause 4). Other cause can be also the problem with cooperation of companies on the site – which can be produced by the fact, that the site is occupied by other companies (cause 5), or the fact, that the material arrived in delay (cause 6).

3. Determination of evaluation criterias – we need o determine the quantitative or qualitative criterias which correspond to our vision
4. Creation of options – the developping of options is a creative part of the decision-making process. We need to be sure, that the options are the widest and varied possible. For this results, following methods can be used:

a. Intuitive methods[76]
    i. **Brainstorming – „**an activity or business method inwhich a group of people meet to suggest a lot of new ideas for possible development“[77]
    ii. **Brainwriting –** similar technique to Brainstorming. This method of putting ideas on the paper was firstly introduced by Bernd Rohrbach in German magazine in 1969.[78]
    iii. **Gordon's method –** this method made by Thomas Gordon is criticizing the brainstorming. Gordon's method seaks for one optimal solution only. Usually, the lector or the manager provoke wide discussion of concrete subject. By asking clever questions the manager lead the group of people to one possible solution.[79]
b. Systematical-analytical methods
    i. **Morfological analysis –** Problem is divided into smaller problems. The project team is after looking for variants how to solve each smaller problem. By concetrating on smaller problems, we can find out the solution for the big one.[80]

    Case study:

    Problem of assembling platform without support of plans

    Discussion: problem of mounting, no measurements provided, only approximative proposals, fixations on each side problematic

    Ideas of mounting proposed.

    Morfological analysis: problem divided into the problem of assembling the platform to the wall, craning and the specifications about the measures.

    Solution: each problem tracked and discussed individually. Some problems because of the morfological analysis could be solved directly. Repartition of the problem into smaller problems helped to avoid 80% of problems.

[76] FOTR, Jiří; DĚDINA, Jiří. *Manažerské rozhodování*. Praha: Vysoká škola ekonomická v Praze, 1993. ISBN 80-7079-939-0.
[77] https://dictionary.cambridge.org/dictionary/english/brainstorming, 13.6.2019
[78] https://www.mindtools.com/pages/article/newCT_86.htm, 13.6.2019
[79] http://www.andromedia.cz/andragogicky-slovnik/gordonova-metoda, 13.6.2019
[80] http://managment-marketing.studentske.eu/2008/06/c-generovn.html, 13.6.2019

5. Determination of the consequences – by analysing impacts with use of previous methods
6. Evaluation of the consequences and chosing the right option – we exclude all the options which are not suitable to our vision and the options, which are less favourables than the others.[81] After, we can use the methods of multicriterial evaluation as:
    a. **Saaty's method –** shows us, which criterion is more important than the other
    b. **Weighted scoring method** – „The goal of the weighted scoring approach is to derive an objective, quantitative business value for each competing item on your list. You can then use those values to determine which items should be prioritized on your roadmap."[82]
7. Realization of the chosed option and control of results

6.2 Communication

A good communication is facilitating the work in team. This is why the communication can't be forgotten in the project management or in this thesis.

6.2.1 Principles of good communication

- Listen actively and accept the partner in communication
- Be patient
- Be tolerant
- Say true and understandable information
- Try to be friendly with unformal accent
- Criticize constructively
- Be assertive
- Take responsibility for what is being communicated
- Enter in the discussion with personality
- Give feedback[83]

6.2.2 Internal communication

In intern communication it is important to avoid phrases as: „You have to" or „You must". It is also necessary to don't give any advices if the employee didn't ask for

[81] ŽÁČEK, Vladimír. *Rozhodování v managementu: Teorie, příklady, řešení*. Praha: České vysoké učení technické v Praze, 2015. ISBN 978-80-01-05804-6.
[82] https://www.productplan.com/glossary/weighted-scoring/, 27.6.2019
[83] DOLEŽAL, J; MÁCHAL, P.; LACKO, B.. *Projektový management podle IPMA*. Grada Publishing. Praha 7, 2011. ISBN 978-80-247-2848-3.

them. It is also recommended to don't use the undefined phrases as: „This should be done…", the employee does not understand if it's intended for him.

Meetings

Meetings are necessary for reinforcing the team spirit. Meetings have special rules to follow to make sure everyone has understood the output of the meeting. We have to determine the main goal of the meeting and consider, if we need to summon others for meeting (too many meetings are not necessary) as who really needs to be present on the meeting. The most important information needs to be said in the very beginning, because after the attention decreases. It is also recommended to provide material before the meeting to collegues to make sure they are prepared for discussion.

In the project Schweighouse the most important meeting which was obligatory was every Thursday with the client. Other meetings were made only with the presence of the director of EFM Steel France. No week or day meetings in the group were done.

Electronic communication

Electronic communication is very formal and official type of communication. It is not reccommended to communicate only electronicaly, this type of communication is short of personal charm.[84]

As already mentionned, electrical communication in the form of emails was chosen for the project of Schweighouse. No other official communicational channel was used.

6.2.3 External communication

External communication includes the communication with suppliers, clients, bank etc. In external communication we can include marketing, public relations or branding. Because the company EFM Steel is oriented on B2B (business to business), no special marketing actions or communication with public sphere were required. The promotion of the company was made only by the logos (clothes, cards etc).

6.3 Work conditions

Work conditions are described in the French law. The most crucial conditions for the company EFM Steel were:

Working hours:

[84] JANDA, P. *Vnitrofiremní komunikace*. Grada Publishing. Praha 7, 2003. ISBN 80-247-0781-0.

- Number of hours worked in one week does not exceed 48 hours.
- Number of hours worked in one day does not exceed 10 hours.
- Minimal number of free days is 1 per week
- Standard working week is 35 hours per week, 8 worked hours plus are paied 25% more, remaining 5 hours are paied 50% plus.
- Employee has the right for 1 hour pause during the 8-10 hours shift.

Weather conditions:

- Works are stopped immediately whenever there is storm or heavy raining+snowing
- Works especially on platforms are stopped immediately whenever there is wind speed more than 8m/s
- The work shift can be stopped or shorten due to high degrees of heat

Health and safety:

- Each worker need to pass test about H&S conditions before entering the site
- Every worker has to obey the conditions of health and safety presented during the H&S training or the site supervisor

Documentation:

Each worker needs to present following documents:

- ID
- Medical report

Foreigners must complete the documents with:

- SIPSI – declaration of detachment
- A1 – insurance documentation
- BTP card for construction workers
- Contract with declaration of salary higher than minimal wage in France
- Licences and certificates translate in french
- Commissionning of foreigner representant (in case the worker does not speak french)

Others:

- Workers have the right for – sanitaries, canteen, source of hot and drinkable water, shelter

6.4 Kick-off of the project

Similar to football, the kick-off meeting is the important kick-off of the project. It is the very first meeting with the responsible persons, who will manage the whole project. „The purpose of a project kickoff meeting is to introduce the team, understand the project background, understand what success looks like, understand what needs to be done, and agree on how to work together effectively – it's a chance to level set and get the team and client on the same page."[85] For the kick-off meeting is being made following agenda:

1. Introduction of the project team
    - Garant B.Changivy
    - Project manager J.Benbouhout
    - Assistant K. Slabá
    - Foremen P.Denis, Y.Zlatic
    - Contractors company Grandweld, EFM Steel Luxembourg
2. Name and goal of the project
    - project of extension and rehabilitation of the factory SUEZ
    - Goal: construction works with respect of time and budget
3. Outputs of the project
    - X€
    - Successful project with low expenses
4. Why is the project realised and what are the benefits?
    - New trustworthy client
    - Not complicated work
5. Main schedule
6. Budget
7. Responsibility matrix – see chapter 3.4.2

    R – responsible – subcontractors

    A – accountable – foremen, project manager

    S – support – assistant

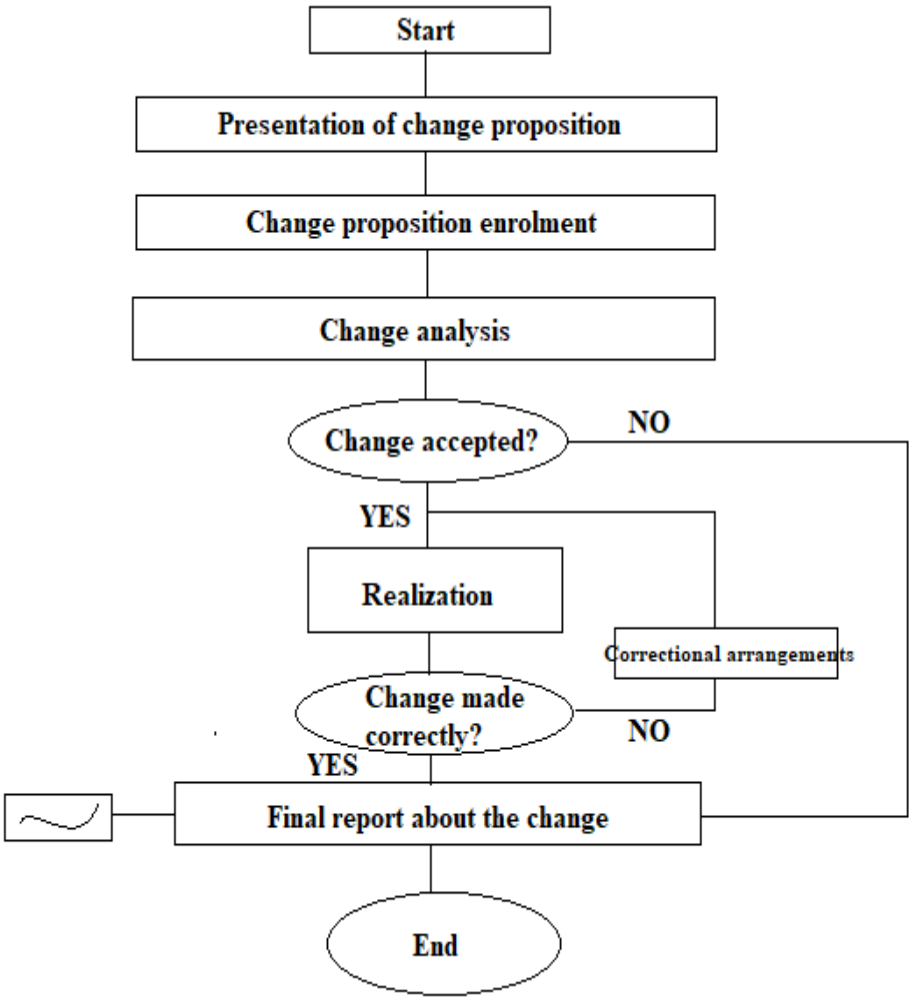
    C - consulted – B.Changivy

    I – informed – client

[85] https://thedigitalprojectmanager.com/project-kickoff-meeting/, 4.7.2019

8. Main restrictions – time scope, budget, French legacy, weather conditions …see chapter 2.3.2
9. Control and reporting – chapter V.
10. Change management process[86] - change management process shows us the possible chain of changes in the project

Figure 11 Change management process



Source 18 Karolína Slabá

In this change management process we can see how the changes can be managed. For example, we have some proposition of change, which can help us to smooth out the process. Whenever is the change enroled, we need to make an analysis of the change and decide, if we/or the client or other involved party are going to accept this change. If yes,

[86] DOLEŽAL, J.; KRÁTKÝ, J. Projektový management v praxi. Grada Publishing. Praha 7, 2017. ISBN 978-80-247-5693-6.

we can transform our change into reality. If no, we report the proposed change anyway and we can start again by other change proposition.

6.5 Operations management

„Operations management deals with approaching day-to-day as well as strategic business issues systematically. Project management deals with planning, organizing, motivating, and controlling resources to achieve specific goals.“[87] Operations management is procceded by lower management on daily basis and concerns usually the supply chain management, logistics management or solving of daily problems – conflicts and crisis.

6.5.1 Conflict

Conflict is defined by Cambridge English Dictionnary as: „an an active disagreement between people with opposing opinions or principles.“[88] As in negotiation, there are multiple resolutions for conflicts, as win-win, win-lose, lose-lose or compromise.

In conflict resolution, manager is supposed to have some key competences, as knowledge of the conflict management, being aware of own reactions and reactions of others. It is also important to know how to make constructive reaction and how to prepare own team to make easy conflict resolutions.

Productive resolution of conflicts needs:

- Emotional distance
- Factual conversation
- To listen
- Name the conflict conflict
- Try to find the solutions

6.5.1.1 Case study

Conflict – Main supervisor on the site was in the same time the director of the concurrent company.

Impact – Company EFM Steel was presented repeatedly by the supervisor to the client in negative light. Analysed company found herself being in disadvantage as the

[87] https://www.beds.ac.uk/research-ref/bmri/centres/bisc/opm, 7.7.2019
[88] https://dictionary.cambridge.org/dictionary/english/conflict, 8.7.2019

supervisor tried to make favourable his own company. The works didn't go so smoothly as the supervisor repeatedly gave false information or didn't provide information at all.

Threath – loose of the client's trust and leaving the site

Solution – the site manager of EFM decided to follow the productive process of resolution of conflicts with factual conversation with the supervisor. The impact was, that the behaviour of the supervisor escalated in much more agressive politics against the named company.

With the goal of staying professional, as step two the site manager didn't try to repay the agressive politics of supervisor but to concentrate on reporting a factual results of the company EFM Steel and the quality and speed of works on daily basis.

Impact – whenever the client got the results of works from EFM Steel, he had the comparision to what was told and what was acctualy done. The site manager opened the window for discussion with the client, in which the supervisor lost his credibility and company EFM Steel regained and strenghten its position on the site.

6.5.2 Crisis management

„Crisis management is the identification of threats to an organization and its stakeholders, and the methods used by the organization to deal with these threats. Due to the unpredictability of global events, organizations must be able to cope with the potential for drastic changes in the way they conduct business. Crisis management often requires decisions to be made within a short time frame, and often after an event has already taken place.“[89]

The reccommended proces for crisis resolution is:

- Calm down and calm down others
- Analysis of the situation
- Plan of action
- Inform the superior
- Get rid of everything you don't need in the moment
- Prepare the crisis communication
- Develop a team of crisis management
- Work, control the progress and react quickly

[89] https://www.investopedia.com/terms/c/crisis-management.asp, 8.7.2019

- Prepare solutions after crisis
- End of the crisis – evaluation[90]

6.5.2.1 Case study

Conflict – First site manager with poor managerial skills and no time management, weak teamwork.

Impact – almost complete loss of credibility of the whole team in the eyes of the client. Complete decomposition of the team. Lost of interest of subcontractors. Team members demotivated. No progress of works. Loss of money. Site manager unmotivated aswell.

Threath – leaving the site, loss of trustworthy subcontractors. Budget loss and penalties. Loosing important client.

Solution – Change of site manager by other more participative and directive. Decision made by the garant of the project and the client, who asked the change of site managers.

Impact – Rapide progress of works, gain of client's credibility.

Discussion: This case of crisis was very specific due to the origin from the site manager. The case was very hard to solve since the fault came from the weak managerial skills of the chief and no motivation for the progress of the project. Multiple conflicts escalated into crisis, and to the demand of client to change the site manager. This leaded to better control of even the upper management.

6.6 Negotiation

„Negotiation is a method by which people settle differences. It is a process by which compromise or agreement is reached while avoiding argument and dispute. In any disagreement, individuals understandably aim to achieve the best possible outcome for their position (or perhaps an organisation they represent). However, the principles of fairness, seeking mutual benefit and maintaining a relationship are the keys to a successful outcome.“[91]

The aim of every negotiation is the win-win approach, which means, that every concerned part leaves the meeting with a profit. The approach win-lose is short-sighted, but very common. It does not lead to stable partnerships but short-term profit.

[90] KHELEROVÁ, V. Komunikační dovednosti manažera. Grada Publishing,1995. ISBN:80-7169-223-9.
[91]

In the negotiation we need to be able to recognize the manipulative tactics from others. There are plenty of bargaining tactics as emotional exagerating, disadvantage in time and place, numerical superiority and others.

6.6.1 Types of negotiators

- Assertive (agressive) – „“win” oriented. Often direct and blunt to the point of being harsh. This type is generally lacking in empathy and sees time as money. They get big victories early on, but then burn people out. They ultimately drive people, relationships and opportunities away.“
- Accommodator (relationship oriented) – very often being pushed to the corner and leaving with no profit
- Analyst (conflict avoidant) – seaks for the „win-win“ approach

6.6.2 Four factors of negotiating

The result of every negotiating is influenced by four factors:

- Power – potential to influence people, gain the control over people, be self-concious. This power originate from preparation, knowledge and authority.
- Time – for the negotiating and preparation
- Information – gain of the most specific information possible
- Skills – communicational skills, specific knowledge

6.6.3 Case study

Conflict – Steel construction material came from the supplier (not EFM Steel) with lot of defects.

Impact – Company EFM Steel, responsible for the mounting couldn’t meet the deadlines because of lot of modifications. Loss of big part of budget.

Threath – financial penalties, loss of credibility. Dissatisfied workers. Loss of budget.

Solution – Negotiating of the site manager with the client about all the modifications. Result of the negotiation – reporting of every modification and time spent. Every hour spent on modifications paied extra. The reported chart to be seen below. The number of the modification is indicated in the first column and specific number of the beam in the second. The problem is indicated in the column „défaut“. The very next column indicates the hours of modification, next how many workers have worked on the modification and how much it is altogether. For example, 2 hours of modifications multiple by 2 workers

makes 4 hours altogether to make the modification. The last column indicates if some material was used and what was the price of the material.

Figure 12 Modifications in the project Schweighouse

Nonconformités sur le chantier de Schweighouse						
	N° poteau	Défaut	Heures de modification	Nombre des monteurs	Au total	Matériel fabriqué
1.	816	attache pour contreventement soudé de l'autre côté	2	2	4	0
2.	3585	3 attaches pour contreventement soudés de l'autre côté	3	2	6	0
3.	2008	mauvaise emplacement des trous, perçage et coupe d'une partie de poteau	1	2	2	0
4.	3595	nécessité de couper une partie de poteau	1	2	2	0
5.	2393	mauvaise emplacement des trous, attache soudé de l'autre côté	5	2	10	0
6.	2004	mauvaise emplacement des trous, coupe nécessaire sur deux parties de poteau	2	2	4	0

Source 19 Karolína Slabá

Impact – clarification of the time delay. Gain of credibility with reporting almost every beam. No financial threaths.

Discussion – In this case study unfortunately the win-lose approach was chosen. If the company EFM Steel continued to work without reporting the modifications, it would mean a great financial loss, since during one month was counted about 500 hours of modifications.

7 Monitoring and Controlling – aim of the project goal

7.1 Time schedule

The control of important element in the project, the time, includes:

- Affecting factors, which are creating the changes in the project with the aim of success
- Getting to know that the plan has changed
- Managing own changes

7.1.1 Inputs

The inputs of the time schedule control are:

Performance reports – to be found in chapter 7.4.3 the work report.

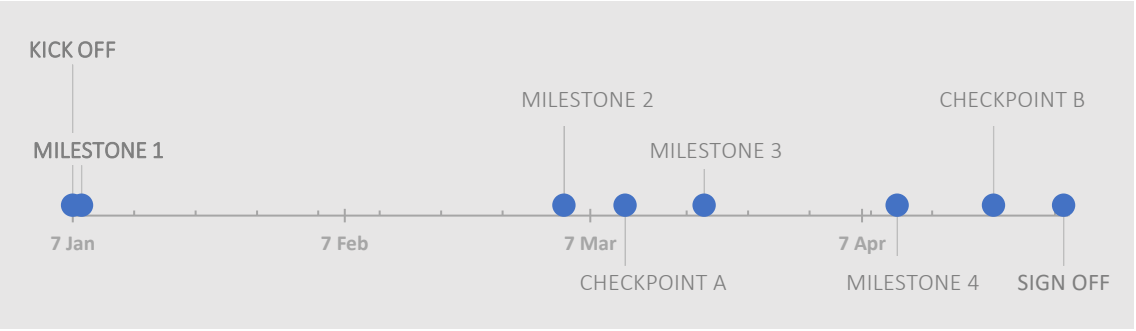
Time schedule plan – the original time schedule plan in the form of Gantt charts can be found in the annexes. Because of the vastness of the plan we can use for ilustration just the most important moments of the project - the milestones. Milestones can be easily seen on the time axis:

Table 10 Milestones axe data

DATE	MILESTONE	POSITION
07.01.2019	Kick Off	15
08.01.2019	Milestone 1	5
04.03.2019	Milestone 2	10
11.03.2019	Checkpoint A	-5
20.03.2019	Milestone 3	5
22.04.2019	Milestone 4	10
11.04.2019	Checkpoint B	-5
30.04.2019	Sign Off	-5

Source 2 Karolína Slabá

Figure 13 Milestones of the project Schweighouse



Source 1 Karolína Slabá

The description of the milestones above can be found in table below. We can see on the axe that five most important milestones were planified: the start of works (M1), the stoppage of two lines (M2), the positioning of the silo (M3), assembling of filtres (M4) and reactivation of lines (M5). Milestones were completed by Kick-off meeting and signing off the site. We can see also two checkpoints – checkpoint A and checkpoint B.

Table 11 Milestones data

MS n°	Milestone	Plan
Kick off	Kick off meeting	07.01.2019
M1	Start of works	08.01.2019
M2	Stoppage of two lines	04.03.2019
M3	Positioning of the silo REFIOM	11.03.2019
M4	Assembling filtres	20.03.2019
M5	Reactivation of lines, end of works	22.04.2019
Sign off	Leaving of the site	30.04.2019

Source 2 Karolína Slabá

7.1.2 Methods

Software support for project managing – in the time of technological progress the softwares as Microsoft Project or Monday.com can easily manage the whole projects with all its changes.

Complementary plans – if new tasks appear it is sometimes required to create complementary plans.

Divergences measurement – shows us the differences between what was planned and what was done in the time schedule. Following data are required for the chart of divergences:

In the following chart we can see the planned milestones, and when we could reach the real milestones. For example, the Positionning of the silo Refiom was planned on 4th of March. Because of the late delivery of some parts of the construction, the whole plan was shifted by a month.

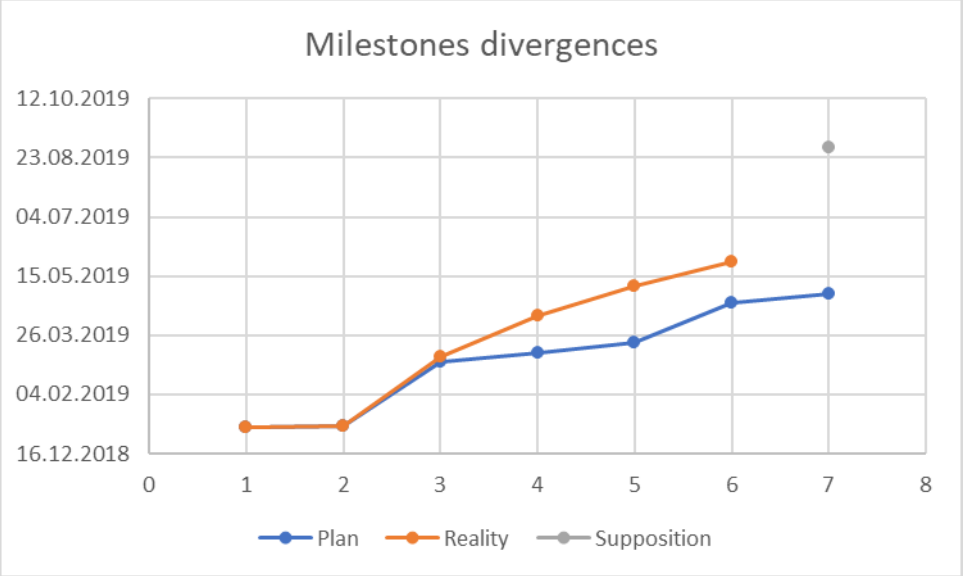
The works on this project were unofficialy ended the 27th of May, but because of loads of modifications the works still continue, even though the most important part was already done and the factory can produce.

Table 12 Milestones - plan vs.reality

MS n°	Milestone	Plan	Reality	Supposition
Kick off	Kick off meeting	07.01.2019	07.01.2019	
M1	Start of works	08.01.2019	08.01.2019	
M2	Stoppage of two lines	04.03.2019	08.03.2019	
M3	Positioning of the silo REFIOM	11.03.2019	12.04.2019	
M4	Assembling filtres	20.03.2019	07.05.2019	
M5	Reactivation of lines, end of works	22.04.2019	27.05.2019	
Sign off	Leaving of the site	30.04.2019		01.09.2019

Source 3 Karolína Slabá

Table 13 Milestones divergences chart



Source 4 Karolína Slabá

In this chart we see the milestones divergences. The blue line represents what was planned and scheduled above (7.1.1 inputs) and the orange one the reality when we could meet the milestones. The grey dot is the supposition of the end of the works in the future.

7.1.3 Outputs

Acquired experience – all the acquired experience information should be reported somewhere to avoid the same faults in the future

Corrective steps – with the aim to finish the project in required time.

7.2 Quality

The management of quality includes the control of concrete results of the project and the goal to determine if they follow the required norms of quality. The control should be done regurarly during the project. The project team should have the knowledge to consider the quality of the product and the differencies between:

- Prevention – which means to eliminate the risks of errors to process, and control – eliminating the risks that errors are shown to the client
- Control by comparision (the result is convenient or not) and control by measuring – the result is measured by some criteriom
- Special causation and accidental causations
- Tolerance (the results is acceptable if it is in tolerance) and regulative limits (process meets the norms, if it fits into regulative limits)[92]

7.2.1 Inputs

- Work outcomes – they include the outcomes of the process but also the product.
- Quality plan – described in chapter 5.
- Norms required by the client

7.2.2 Methods

Control

Control means the measuring, examination and testing of the product on the daily basis. The control in the project Schweighouse was executed every day by the foremen or the project manager. For the control of the product was also responsible the supervisor of the site and client. By the supervisor were proposed following controls:

- Bolts and nuts – some bolts and nuts didn't meet the norms of lenght of threads (requirement of the client – minimum two to three threads protruding from the nut)

[92] ŘEHÁČEK, P. *Projektové řízení podle PMI*. Ekopress. Praha, 2013. ISBN 978-80-86929-90-3. Page 106.
https://www.projectsmart.co.uk/pareto-analysis-step-by-step.php, 5.7.2019

- Bolts and nuts – some bolts too loose - necessity of tightening for a precious moment
- Stairs – didn't meet the standards of the European Union, fault from design department – necessity of repairing

Pareto's chart

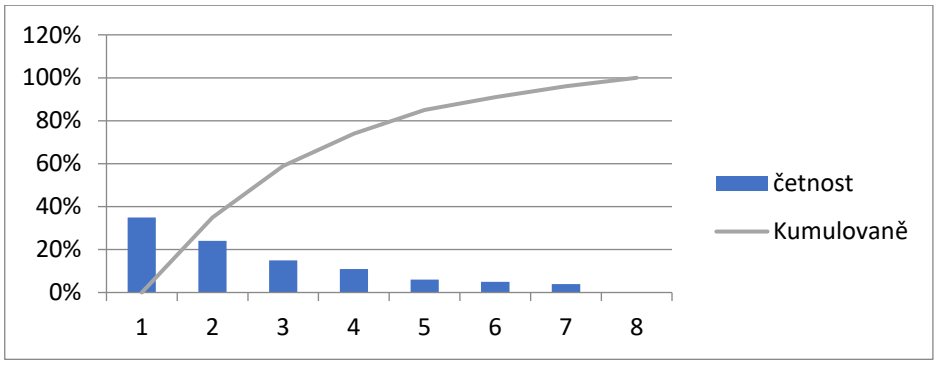
„A vast majority of problems (80%) are produced by a few key causes (20%). This technique is also called the vital few and the trivial many."[93] The Pareto chart is made by the numerosity of the key causes and the cummulative percentage. The Pareto chart is linked with the Pareto principle, that the 80% of the effects come from 20% of the causes.

Table 14 Data for Paretto's chart

Problem	Numerosity	Cummulative percentage
Smaller modifications	35%	35,0%
Greater modifications	25%	60,0%
Structural modifications	15%	75,0%
Assembling faults	10%	85,0%
Design modifications	5%	90,0%

Source 5 Karolína Slabá

Figure 3 Pareto's chart example



Source 6 Karolína Slabá

The blue columns represent the numerosity of the key causes and the grey the cummulative percentage.

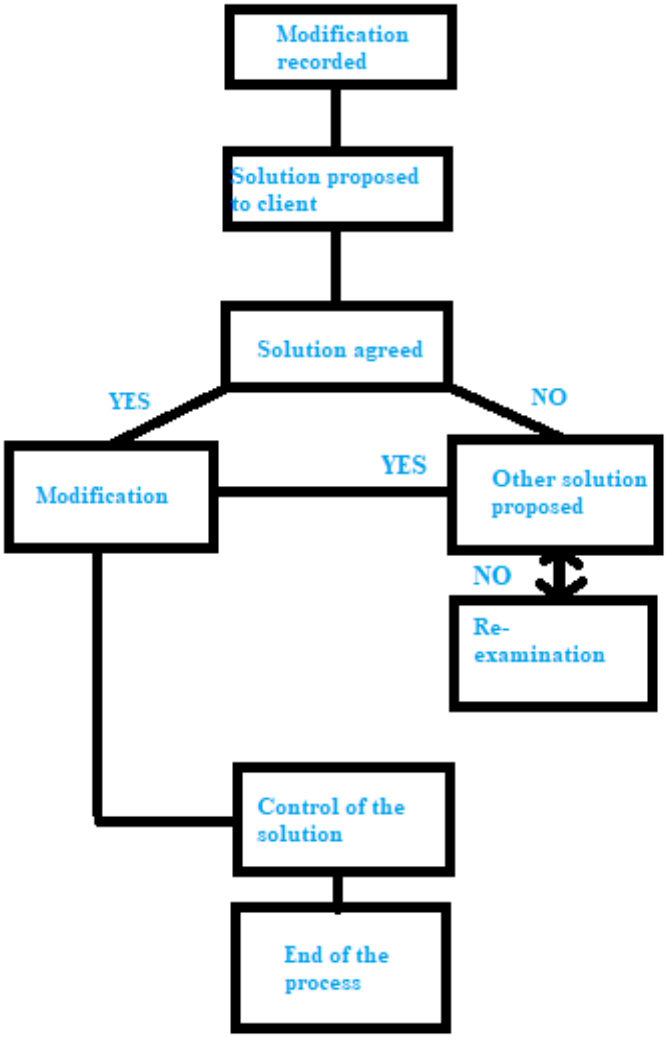
Flowcharts

[93] https://www.smartdraw.com/flowchart/, 5.7.2019

„A flowchart is a visual representation of the sequence of steps and decisions needed to perform a process. Each step in the sequence is noted within a diagram shape. Steps are linked by connecting lines and directional arrows. This allows anyone to view the flowchart and logically follow the process from beginning to end.“[94]

The flowchart is shown on following example of the modification decision-making process:

Figure 4 Flowchart of modification treatment



Source 7 Karolína Slabá

On this figure we can see the flowchart of decision making process. After the modification was recorded, there was a solution proposed to the client. If the solution was

[94] Řeháček, Petr. Projektové řízení podle PMI. Ekopress. Praha 4, 2013. ISBN 978-80-86929-90-3. Page 98.

agreed, the modification of the piece was done, if not, another solutions was proposed or the case was reexamined.

Trend analysis

Trend analysis includes the use of matematical techniques for predicting the future outcomes based on the previous outcomes. We use this method usually for:

- Technical review – for example how many faults has been tracked and how many of them is not repaired
- Terms and cost fullfilment

7.2.3 Outputs

- Quality improvement – includes the acceptation of the changes of the client and correctional arrangements
- Decision of accepting – control material is either accepted or denied. Denied product can be repaired and proposed again for decision of accepting
- Filled control list – other proposition of control of quality – the control list to be seen in annexe n˚2
- Process adjustment – are the immediate changes made because of the control measurements.
- Modifications – the modifications of material in the project are the source of problems in the project. In the project of Schweighouse, the modifications made a great part of the works. For the modifications was made a special report in form below.

For tracking of modifications the management team chose the system of control of reporting made by the workers. Whenever the workers as first incomings noticed a required modification, they considered the seriousness of the modification.

The scale of the seriousness was divided into:

- Smaller modifications – usually making of new holes, shortening of the beam, no need to report these modifications to the foremen

- Modifications of medium seriousness – need to report to foremen, decision consulted by the project manager and announced to the client
- Structural modifications – problem reported to the project manager and client. Decisions made by the design office.

Table 15 Modifications

Nonconformités sur le chantier de Schweighouse						
	N° poteau	Défaut	Heures de modification	Nombre des monteurs	Au total	Matériel fabriqué
1.	816	attache pour contreventement soudé de l'autre côté	2	2	4	0
2.	3585	3 attaches pour contreventement soudés de l'autre côté	3	2	6	0
3.	2008	mauvaise emplacement des trous, perçage et coupe d'une partie de poteau	1	2	2	0
4.	3595	nécessité de couper une partie de poteau	1	2	2	0
5.	2393	mauvaise emplacement des trous, attache soudé de l'autre côté	5	2	10	0
6.	2004	mauvaise emplacement des trous, coupe nécessaire sur deux parties de poteau	2	2	4	0

Source 8 Karolína Slabá

Modifications on daily basis were written in notebooks by the headman of each working group and photos before and after the modification were taken. The workers recorded the beam number or problem of modification; the hours spent on the modification; number of workers and a little description about the problem, why the modification was necessary.

The notebooks were rewritten by the assistant twice a week to the excel spreadsheet (table above) and photos as an evidence presented in the Powerpoint Presentation. This spreadsheet with PPT presentation were introduced to the client after each 14 days of works.

7.4 Performance and costs

What it concerns the performance of the workers and the costs we need to have a clear system of reporting. This process includes:

- Reporting frequently the current state of the works

- Reporting frequently the progress of the works
- Predicting the future[95]

7.4.1 Inputs

As the general inputs in the performance tracking we can consider for sure the:

Plan of the project – complex of the plans and descriptions mentionned in chapter 5. Planning of the project. Includes the scope plan, the WBS, strategy of the upper management, costs estimations, important milestones, key workers, key risks, other plans of management – communication, procurement, quality etc. In our case it includes also the technical specification, additional information and others.

Work outcomes – the work outcomes are in form of delivery notes, the use of material and invoices for the required material.

7.4.2 Methods

Reexamination of the performance – it is the act of reexamination of the project. This method can be shown on the case study:

Problem: low performance of workers in the beginning of the project, no progress of works.

Threath: terrible delay, loose of money and a client.

Discussion: first group of workers wasn't well coordinated by the foreman. The foreman spent a lot of time with his own work but didn't have the time to control and manage his team.

The team and also the whole company started to look like in the eyes of the client as uncomplete and the progress of works was worse as the project continued and the motivation of workers lowered. The workers themselfs were not individually bad workers but couldn't work efficiently as a team.

Solution: Proxy of the foreman. Each of the workers which the assistent knew from previous projects was analysed – primarily his forces and weaknesses. Following mistakes were analysed:

- Foreman of the group is the best welder of the group – always busy with welding – no control of the group

[95] Jennifer Greene, Andrew Stellman : Head First PMP, O'Reilly Media, ISBN 978-0-596-80191-5

- His representant and best friend who was considered as the second leader of the group was specialized on the workshop and not on mounting
- Other members of the group were young and demotivated/scared to take the responsibility in mounting.

A new foreman for the group from the French side was joined to the team. This foreman was informed about the forces and weaknesses of each worker and concentrated each worker on the tasks they were able to do without any doubt so the works could progress. It means:

- Previous foreman: welding works
- Second foreman: assembling works on the land, preassembling works
- Young workers: mounting in heights

The team started to be more efficient when this strategy was applied. The specific works of each employee raised the motivation and the project started to progress.

Earned Value Management[96] – the principle of this method is to determine, how many costs and time were spent and how big was the difference between the date we have planned. For this method we use following measures:

PV – planned value

EV- earned value

AC – actual cost

BAC – budget at completion.

For the ideal project this equation is applied:

PV=EV=AC= in the end of the project =BAC

Example from project Schweighouse estimation of works on pneumatic transport:

Task: assembling of 60 metres of piping of pneumatic transport.

Estimation: 80 working hours

[96]https://www.pmconsulting.cz/pm-wiki/evm-earned-value-management/, 3.8.2019

Plan: work during 10 hour shifts for 8 days.

Costs: 1 hour of works approximately 20 euros.

Budget: $80*20=1600$ euros. So BAC=1600.

Each hour should be done 0,75m of the piping. We have predicted, that the half of the piping (30metres) will be done in the end of the day 4. By the plan the 50% should be done, so the planned value is:

PV=800 euros.

In the reality the project of piping was changed by the client and the piping needed to be modified, so the planned 30 metres were done instead of 4 days in 6 working days, so the actual cost was:

$AV=60*20=1200$.

The earned value – the work done in the day of control was 20 metres of piping. So one third of the whole piping – 33,3% of the 1600 euros is

EV= 532,8 euros.

Cost variance

CV=EV-AC= 532,8 – 1200= -667,2

This quotation shows us that the planned costs differs in the day 4 by 667,2 euros for the performance of 20 metres of assembling the piping.

Cost performance index

$$CPI = \frac{EV}{AC}$$

CPI=532,8/1200=0,44%

The value 0,44% tells us, that we work with the efficiency lower than half of what we predicted.

Schedule variance

SV=EV-PV=532,8-800=-267,2 euros

With this quotation we have discovered, that we have lost 267,2 euros from what we have planned.

Schedule performance index

For the schedule performance index we will use this equation:

$$SPI = \frac{EV}{PV}$$

When SPI=1, the progress of works is exactly as planned

When SPI‹1, the works are more slow than predicted

When SPI›1, the works are faster than planned.

SPI=532,8/800=0,66.

The number 0,66 shows us, that we work on only 66% in the difference of what have we planned.

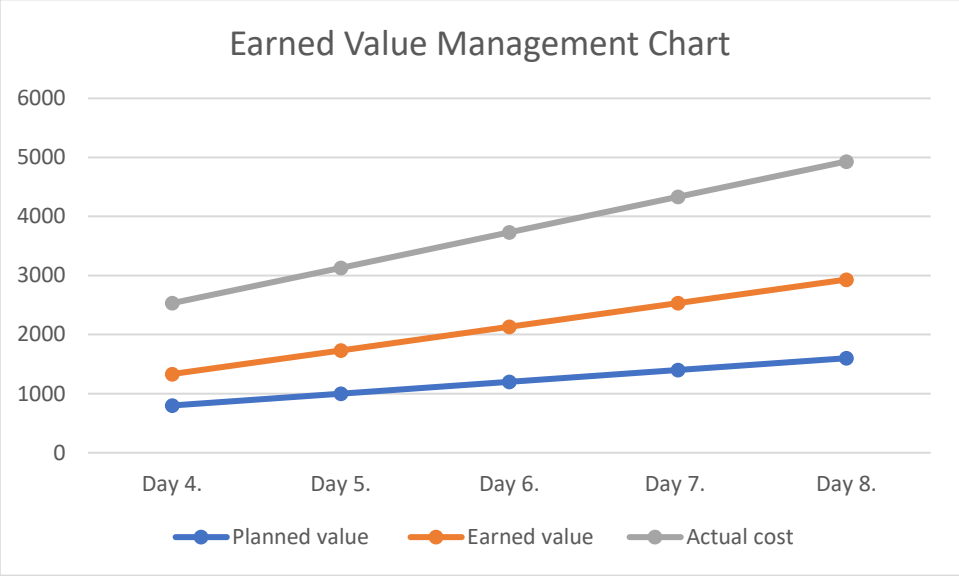
Folowing numbers can be shown in the chart:

Table 16 Earned Value management chart data

Earned Value Management Chart					
	Day 4.	Day 5.	Day 6.	Day 7.	Day 8
%	50	62,5	75	87,5	100
Planned value	800	1000	1200	1400	1600
Earned value	532,8	732	932	1132	1332
Actual cost	1200	1400	1600	1800	2000

Source 5 Karolína Slabá

Table 17 Earned Value Management Chart



Source 6 Karolína Slabá

This chart shows us the difference between the actual cost and the planned value which we have counted above.

Estimation at completion

Is the estimation of how much we will spend in the end of the task. The equation predicts the same progress as after the first control.

EAC=BAC/CPI=1600/0,44=3636,36 euros.

The whole work will cost 3636,36 euros.

Estimation to completion is calculated as:

ETC=EAC-AC=3636,36-1200=2436,36.

For the finish of the task we need 2436,36 more euros.

7.4.3 Outcomes

Work reports-the work reports had been reported in the form of monthly reports. The example of reporting the work progress is below:

Table 18 Monthly reports

TS visés par chantier CNIM de 1.6. - 30.6.2019

Numéro	Item	Descriptif	Nombre des heures
1	Tuyaux de préchauffage	Modifications supports, modification chemin des tuyaux	134
2	Transport pneumatique	Modification de chemin (baisse des supports), fabrication supports	310
3	Modification charpente	Plinthes, garde-corps, platines, marches, poutres etc. - découpe, mise-en place du matériel, soudure	344
4	Montage passerelle silo refiom	Modification supports de la vise, modification poutres, modification charpente (contreventement), mise en place de renfort - vise posée en porte-à-faux (risque de chute)	297

Source 7 Karolína Slabá

We can see in the table above the item of works or specific location of works with a little description. The number of hours which were spent on the works follows in the last column. For example, the first item of the works which were being done in between the 1st of June and 30th of June was the reheating piping. The specific works were to modify the supports of the piping and also the way of the piping. The total amount of hours spent on the reheatment piping was 134.

Another work report was used for tracking the hours of work done by the employees. The example to be seen in annexes (annexe 3.).

7.5 Communication

We need to be sure, that the right information is transfered to the right person in the right time. For controlling the communication process, we are using following inputs, methods which are giving us following outputs:

7.5.1 Inputs

Project management plan

Project management shows all the tools of monitoring, controlling, executing of the project. It also describes the communication channels which are usefull for suppliers and other important persons involved in the project.

Issue log

„An issue log is a simple list or spreadsheet that helps managers track the issues that arise in a project and prioritize a response to them.“[97]It can be used also to track who is responsible for which problem resolution and what is the priority in the moment.

Table 19 Issue Log

Issue Management Log							
Project Name:			Schweighouse				
Project Manager Name:			P.Washington				
Project Ref.:			525				
ID	Status	Priority:	Issue Description	Owner	Date identified	Estimated Resolution Date	Comments
1	closed	medium	nuts and bolts plan not communicated	Jamal	15.01.2019	20.01.2019	Client informed
2	in progress	high	no assembling plan for the construction of the platform silo Refiom	Karolina	10.05.2019	20.05.2019	Design office informed
3	in progress	low	stairs not touching level 0	Jamal	05.02.2019	05.03.2019	civil engineering required
4	closed	medium	loose of compensator	Karolina	12.06.2019	30.06.2019	ordered from supplier
5	open	low	big bags communication	Peter	05.07.2019	05.08.2019	new commission

Source 1 Karolína Slabá

In this Issue Log we can see the priorities in the project in Schweighouse. For example, the 10th of May the construction of the platform on silo Refiom had a very high priority and needed to be communicated as soon as possible. The design office was informed and asked for the plans so the assembling can be done as soon as possible.

7.5.2 Methods

Meetings

To be sure that the information is transfered to everyone who needs it to execute the work, we can organize regular meetings. In the project of Schweighouse there were meetings made with following agenda:

1. Greeting
2. Introduction to the agenda – estimated time of each subject
3. Key problem – explication why was the meeting organized
4. Discussion of the problem
5. Proposed solutions

[97] https://www.projectmanager.com/blog/what-is-an-issue-log, 13.6.2019

6. Brainstorming
7. Process settlement
8. Job description – making sure everyone had understood
9. Repetition
10. Conclusion

Each meeting has its meeting „leader“ who is controlling if the agenda is followed.

Expert Judgement

Expert judment is required whenever the project team needs the opinion of professional for the project improvement. The experts are usually:

- Other units within the organization,
- Consultants,
- Stakeholders, including customers or sponsors,
- Professional and technical associations,
- Industry groups,
- Subject matter experts, and
- Project management office (PMO).[98]

Information management systems

These systems are collecting data from databasis for improvement of the project. The results of the systems are reported in the reports, charts and tables. It also helps to the project manager to capture the information, store it and distribute. As the information management systems we can consider for example the Supply chain management softwares.

7.5.3 Outputs

Project management plan updates

The outputs of the communication control management can provoke some changes in the project management plan. It can include the communication plan but also other parts of the project management plan.

Project documents updates

[98] Project Management Institute. *A guide to the project management body of knowledge*. PMI,2013. ISBN 978-1-935589-67-9.

„Project documents may be updated as a result of the Control Communications process. These updates may include, but are not limited to:

- Forecasts,
- Performance reports, and
- Issue log.“[99]

Change requests

The control communication often requires a quick action, which concludes the change management in the communication control outputs. For this processes we can use the Perform Integrated Change Control process.

[99] Project Management Institute. *A guide to the project management body of knowledge*. PMI,2013. ISBN 978-1-935589-67-9.

8 Closing of the project

8.1 Administrative closing

Administrative closing leans in making of the documentation about all the results of the project. The aim of administrative closing is to formalize the outputs to the client, subcontractors and other involved parties.[100]

8.1.1 Inputs

Documentation of performance measurement – every documentation created with aim to analyse and record the outputs of the project, including the plans.

Documentation of product – description of the product – plans, specifications etc.

8.1.2 Methods

Tools and methods are described in the chapter 7, it concerns reporting, analyses of differencies, analyses of trends etc.

8.1.3 Outputs

The outputs of the project are:

Archival recordings – Complete set of record of project should be prepared for archiving.

Formal receipt – we need to record, that the formal receipt between the client and us was done.

Acquired experiences – what have we learned from the project?

8.2 Closing of the contractual relations[i]

The closing of the contractual relations is similar to the administrative one. We are verifying if all the works were done correctly. Contractual relations can require special conditions, especially if we are talking about premature closing.

8.2.1 Inputs

The input of the closing of the contractual relations is the documentation of the contractual relation. It concerns generally the contract and every plan and timetable possible as all the agreed change processes, accounting documentation and all the control documentation.

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[100] ŘEHÁČEK, P. Projektové řízení podle PMI. Ekopress. Praha 4, 2013. Page 111. ISBN 978-80-86929-90-3.
ŘEHÁČEK, P. Projektové řízení podle PMI. Ekopress. Praha 4, 2013. Page 112, 113. ISBN 978-80-86929-90-3

8.2.2 Methods

Procurement checks – is a group of structured tests of process of procurement and contractual relations. The aim of the procurement checks is to get-to-know what has been done correctly and what was missed in procurement.

8.2.3 Outputs

The outputs of the closing of the contractual relations are for sure the reports and the formalisation of receipt and closing of the project. A concrete person or organisation should inform the client and other involved parties about the closing of the agreement. The requirements of closing and receipt are usually defined in the contract.

8.3 Closing of the project Schweighouse

Unfortunately, the project in the time of finishing this thesis has not been closed yet. The expected time of end is the end of August. Although the project didn't finished yet, the factory already produces since the 27th of May. The connection of the piping has been done and all other works necessary for the functionning of the factory has been done to this day aswell. The rest of the work are delayed because of loads of modifications, which needs to be done properly and because of the delay of the material. However, we can consider, that the main aim of the works has been done. The works are now considered as esthetical works, which already serve the functionnality, but needs to be a little bit modified. The unofficial receipt was done by the day of 27th May, when the factory started to produce. However no closing documentation has not been transfered yet.

9 Conclusion

In conclusion we can state, that we went through all the phases of project management as mentioned in the litterature. The author was seaking for the methods of project management and in the same time applying them on the analysed project of extension and rehabilitation of the factory SUEZ. In each part we answered important questions as:

Initiating:

- What are the expectations of the involved parties?
- What are the involved parties? The sponsor, site manager, client and others?
- Is the project feasible?
- What is the time scope of the project, the vision and the mission?

Planning:

- Who is making part of the project team?
- What is the goal of the project?
- Is the procurement of the project managed?
- What is the budget and schedule of the project?
- How we will manage the communication and quality?
- How are we going to manage the human resources?
- Have we planned the change management?

Execution:

- What means teamwork in our project?
- Who is the leader?
- Who is responsible for what?
- How are we going to plan the decision-making?
- How are we going to manage the conflicts and crisis?

Measuring and controlling:

- How did we measured the time scope, budget and performance of our team?
- How did we track the quality of the work?

Closing:

- Are all works concluded? With what impact?
- What is the lesson we have learned from the project?

In the thesis multiple methods how to improve the project management skills were used as:

SWOT analysis, Ishikawa or the Fishbone method, CPM, PERT, GERT, Monte Carlo method, Iron Triangle, SMART method, PESTLE, Requirement Traceability Matrix, Work Breakdown Structure, Gantt chart, Time shortening, RASCI, resource histogram, Top-down Estimation method, Parametric modelling, cost management plan, procurement plan, communicational plan, causal chain diagram, causal tree analysis, Saaty's method and many others.

The aim of this thesis was to:

- Analyse the project SUEZ with use of project management methods
- Improve the project management strategy in chosen company
- Learn from faults to improve the work in the future

This work was created with purpose to improve the project management strategy of chosen company using the project of extension and rehabilitation of the company SUEZ as an example.

This work can serve as the guide to people who are interested into project management phases and its methods with examples on the project Schweighouse.

10 SUMMARY

Work „Analysis of the project management methods and their implementation in the project“ had for its goal to describe the possible methods of project management and showing them on project of extension and rehabilitation of SUEZ factory. The author of this thesis wanted to take project management methods in theory, and implement them in practice.

During the work the structure of project management phases is used. The work is divided into initiating phase, planning, execution, monitoring and controlling and closing of the project. Each part is working with the structure of Project Management Institute – the inputs, methods and outputs, inspired by Petr Řeháček, author of the book „*Projektové řízení podle PMI*“ (Ekopress, 2013).

Analysed project is shown from different structures – time scope, budget, procurement, communication, risk management, (human) ressources and quality. The results and propositions made by using the project management methods complete in the fifth chapter, „Monitoring and controlling“, where all the differencies of the project can be seen.

This work may serve other students as a guide for project management methods and their better understanding because of the examples.

Key words: project management, project, methods, planning, initiating, CPM, PERT, GERT, fishbone diagram, monitoring, controlling, PESTLE, communication, crisis, risks, conflict, WBS, Gantt, RASCI, procurement, budget, parametric modelling, SWOT, analysis, causal chain diagram, causal tree analysis, Saaty’s method, Requirement traceability matrix, feasibility study, Iron triangle, SMART, resource histogram, Top-down estimation.

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12 LIST OF FIGURES

13 LIST OF TABLES

Abstract

Surname, name:	Karolína Slabá
Department:	Department of Regional management
Faculty:	Faculty of economics
Title of the work:	Analysis of the project management methods and their implementation in the project.
Supervisor:	doc. Dr. Ing. Dagmar Škodová Parmová
Number of symbols:	166848
Number of annexes:	3
Number of literary titles:	35

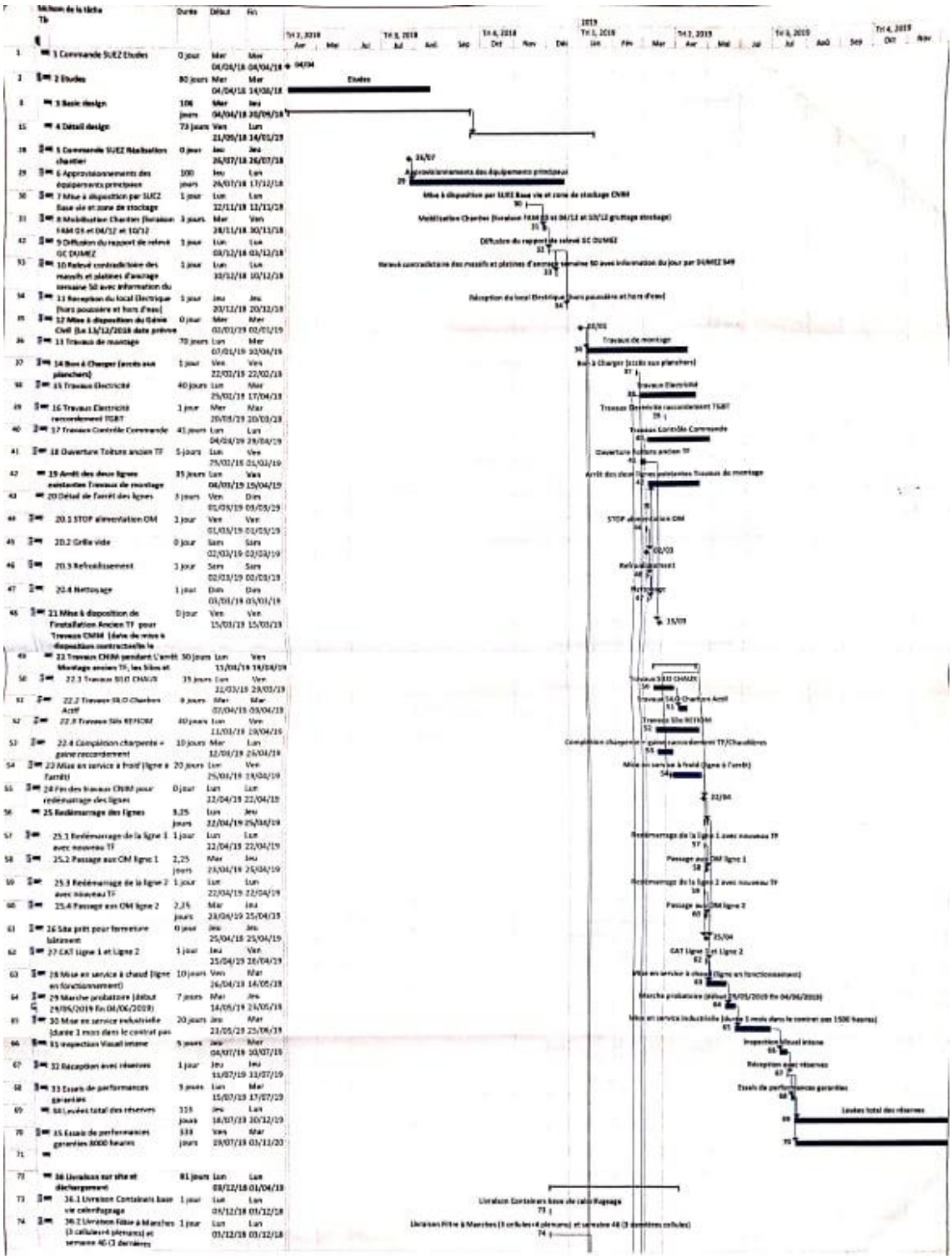
Abstract:

The presented master thesis describes the analysis of project management methods and their implementation in the concrete project. It is oriented on study of project management phases and methods. The practical part shows the methods on example from industrial area.

ANNEXES

Annexe 1

Project plan



Annexe 2

Quality control plan

	Ref Cde EFM :	ITP: Inspection & Test Plan	Client :
	AT2018-600		
	Manutention	Manufacture & Fabrication	Commande n° :
	mâchefers		

Type de machines :	Convoyeurs + séparateurs	Codification Client	Bottom Asch Conveying System

OPERATIONS	INTERVENTIONS			CONTROLES			VISA		
	1	2	3	Date	N° Doc.	Notes	EFM	Customer	Other
1. CONSTRUCTIONS METALLIQUES									
Certificats matières	**CMF 2,2**								
Notes de calculs	**DOC**								
EN1090-2 EXC2									
2. EQUIPMENTS									
* Scalpeur vibrant * Hotte d'extraction	**CE**	**Notice**							
* Convoyeurs à bandes : T1 / T2 / T3 / T4 / T5 * Extracteur sous trémie	**CE**	**Notice**							
Grille vibrante	**CE**	**Notice**							
* Overband 1 * Overband 2 * Séparateur courant *de Foucault*	**CE**	**Notice**							
* Crible rotatif * Vibrant VB1	**CE**	**Notice**							
Autre									
3. ASSEMBLAGES									
Contrôle dimensionnel	**Doc**								
Cahier de soudage	**Doc**								
Contrôle soudures	**100% Visuel**	**10%** Ressuage							
4. FINAL									
Tests en atelier	**Doc**					* Mise en route des stations de tête * Reception des machines chez les fournisseurs			
Contrôle dimensionnel					Echantillonnage de relevés suivant les indications des plans d'ensembles				
5. INSPECTION CLIENT	Inspections à organiser suivant planning								
Tests et contrôles visuels									
Controles dimensionnels									
Controles anti corrosion	**100% Visuel**								
Directive machine *2006/42/CE*	**CE**								
Etiquettage									
Liste de colisage Colisage									
Autre									

Annexe 3

Work record example

RELEVÉ DES HEURES DU TRAVAIL

Au total:		
Commande	Jours	Heures
	0	
	0	
	0	
Les pauses:		1:00:00
Heures supplémentaires:		
Au total =		184:30:00

Travailleur:		worker XY
Chantier 1	AT2019503	SUEZ
Chantier 2		
Chantier 3		
Entreprise:		EFM Steel
Mois:		**Mai 2019**
Le fond du travail:		
Les horaires du travail:		Le nombre des heures - jours

Date	De	À	Horaires	Commande	Congé	Sick Day	Maladie	Pause + déjeuner	Commande - note
1									jour férié
2	7:00	18:00	10:00					1:00	traductrice
3	7:00	18:00	10:00					1:00	traductrice
4									
5									
6									
7	7:00	17:30	9:30					1:00	traductrice
8									
9	7:00	18:00	10:00					1:00	traductrice
10	7:00	18:00	10:00					1:00	traductrice
11	7:00	17:00	9:00					1:00	traductrice
12									
13	7:00	17:00	9:00					1:00	traductrice
14	7:00	17:00	9:00					1:00	traductrice
15	7:00	17:00	9:00					1:00	traductrice
16	7:00	17:00	9:00					1:00	traductrice
17	7:00	16:00	8:00					1:00	traductrice
18	8:00	12:00	4:00						traductrice
19									
20	7:00	18:00	10:00					1:00	traductrice
21	7:00	18:00	10:00					1:00	traductrice
22	7:00	18:00	10:00					1:00	traductrice

23	7:00	18:00	10:00					1:00	traductrice
24	7:00	16:00	8:00					1:00	traductrice
25									traductrice
26									traductrice
27	7:00	18:00	10:00					1:00	traductrice
28	7:00	18:00	10:00					1:00	traductrice
29	7:00	18:00	10:00					1:00	traductrice
30									jour férié
31	7:00	18:00	10:00					1:00	traductrice
TOTAL			184:30:00		0:00:00	0:00:00	0:00:00	20:00:00	

signature de travailleur		signature de chef d'équipe - responsable de l'autorisation		signature de la responsable de la comptabilité des salaires	

[i]